Kitimat LNG

Project Description Summary

Kitimat LNG Expansion Project

Chevron Canada Limited
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KITIMAT LNG EXPANSION PROJECT

Project Description Summary

Kitimat LNG
LNG Plant

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ABBREVIATIONS

BC	British Columbia
BCEAA	British Columbia *Environmental Assessment Act*, S.B.C. 2002, c. 43
BCEAO	British Columbia Environmental Assessment Office
Bcfd	Billion cubic feet per day
BEC	Biogeoclimatic Ecosystem Classification
bpd	barrels per day
BC Hydro	BC Hydro and Power Authority
CEAA 2012	*Canadian Environmental Assessment Act*, S.C. 2012, c. 19
CEA Agency	Canadian Environmental Assessment Agency
Chevron	Chevron Canada Limited
CIRNAC	Crown-Indigenous Relations and Northern Affairs Canada
CHN	Council of Haida Nation
CWH	Coastal Western Hemlock
DFO	Fisheries and Oceans Canada
DMP	Decommissioning Management Plan
DMR	Dual Mixed Refrigerant
EA	Environmental Assessment
EAC	Environmental Assessment Certificate
EAC E06-01	Environmental Assessment (EA) Certificate E06-01
ECCC	Environment and Climate Change Canada
ECCS (formerly MOE)	British Columbia Ministry of Environment and Climate Change Strategy (formerly Ministry of Environment (MOE))
FEED	Front End Engineering Design
FID	Final investment decision
FLNRORD (formerly FLNRO)	British Columbia Ministry of Forests, Lands and Natural Resource Operations and Rural Development (formerly Ministry of Forests, Lands and Natural Resource Operations (FLNRO))
FNLP	First Nations Limited Partnership
former CEAA	*Canadian Environmental Assessment Act*, S.C. 1992, c. 37
FSR	Forest Service Road
Gitga'at	Gitga'at Nation
Gitxaala	Gitxaala Nation
ha	hectares

HAZID	Hazard Identification
HC	Hydrocarbon
HES	Health, Environment, Safety
HNS	Hazardous and Noxious Substances
INAC	Indigenous and Northern Affairs Canada (now Crown-Indigenous Relations and Northern Affairs Canada)
IMO	International Maritime Organization
ISBL	Inside Battery Limits
Kitselas	Kitselas First Nation
Kitsumkalum	KitsumkalumFirst Nation
KLNG Expansion Project	Kitimat LNG Expansion Project
KLNG Foundation Project	Kitimat LNG Foundation Project (Compact E-drive Design)
KLNG Project	Kitimat LNG Project
km	kilometre
km^2	Square kilometre
KM LNG	KM LNG Operating General Partnership
kV	kilovolt
L/s	litres per second
Lax Kw'alaams	Lax Kw'alaams Band
LBW	Land Backed wharf
LNG	Liquified Natural Gas
m	metre
m^3	cubic metre
m^3/d	cubic metres per day
m^3/hr	cubic metres per hour
Mm^3	Million cubic metres
MEMPR (formerly MEM)	British Columbia Ministry of Energy Mines, and Petroleum Resources (formerly Ministry of Energy and Mines (MEM))
Metlakatla	Metlakatla First Nation
MMcfd	Million cubic feet per day
MNBC	Metis Nation of BC
MTPA	Million tonnes per annum

NEB	National Energy Board
NGL	Natural Gas Liquids
OGC	British Columbia Oil and Gas Commission
OSBL	Outside Battery Limits
PPT	parts per thousand
Pre-FEED	Preliminary Front End Engineering Design (*i.e.*, concept definition)
PTP	Pacific Trail Pipeline
ROW	Right-of-way
TC	Transport Canada
TUS	Traditional Use Study
TERMPOL	Technical Review Process of Marine Terminal Systems and Transshipment Sites
TRP	TERMPOL Review Process
UNDRIP	United Nations Declaration on the Rights of Indigenous Peoples
USGC	United States Gulf Coast
VC	Valued Component
WCSB	Western Canadian Sedimentary Basin
Woodside	Woodside Energy International (Canada) Limited
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TABLE OF CONTENTS

TABLES

FIGURES

TABLE OF CONCORDANCE

Guide to Preparing a Description of a Designated Project under the Canadian Environmental Assessment Act, 2012

Project Description Requirements		Section in this Project Description	Notes
1.0	General Information and Contact(s)		
1.1	Describe the nature of the designated project, and proposed location (2–3 paragraphs; note additional location details are to be provided in section 3).	1.1 Project Summary	
1.2	Proponent information		
1.2.1	Name of the designated project.	1.1 Project Summary	
1.2.2	Name of the proponent.	1.3 Proponent Contact	
1.2.3	Address of the proponent.		
1.2.4	Chief Executive Officer or equivalent (include name, official title, email address and telephone number).		
1.2.5	Principal contact person for purposes of the project description (include name, official title, email address and telephone number).		
1.3	Provide a list of any jurisdictions and other parties including Aboriginal groups and the public that were consulted during the preparation of the project description. (A description of the result of any consultations undertaken is to be provided in sections 7 and 8).	1.4 Jurisdictions and Parties Consulted	
1.4.1	Provide information on whether the designated project is subject to the environmental assessment and/or regulatory requirements of another jurisdiction(s).	1.5 Regulatory History and Context	
1.4.2	Provide information on whether the designated project will be taking place in a region that has been the subject of an environmental study. Proponents are advised to contact the Agency during the preparation of the project description for information regarding any regional environmental studies that may be relevant.	1.5 Regulatory History and Context	
2.0	Project Information		
2.1	Provide a general description of the project, including the context and objectives of the project.	2.1 Project Purpose and Rationale	

Project Description Requirements		Section in this Project Description	Notes
2.2	Indicate the provisions in the Regulations Designating Physical Activities setting out the designated activities that describe the project in whole or in part.	2.2 Designated Physical Activities under *Canadian Environmental Assessment Act* (CEAA) 2012	
2.3	Components and activities Provide a description of the components associated with the designated project, including:	2.3 Project Components and Activities	
2.3.1	The physical works associated with the designated project (e.g., large buildings, other structures, such as bridges, culverts, dams, marine transport facilities, mines, pipelines, power plants, railways, roads, and transmission lines) including their purpose, approximate dimensions, and capacity. Include existing structures or related activities that will form part of or are required to accommodate or support the designated project.	2.3.1 Project Components	
2.3.2	Anticipated size or production capacity of the designated project, with reference to thresholds set out in the Regulations Designating Physical Activities, including a description of the production processes to be used, the associated infrastructure, and any permanent or temporary structures.	2.3.1 Project Components	
2.3.3	If the designated project or one component of the designated project is an expansion, the percent of increase in size or capacity from the existing project (relative to the thresholds set out in the Regulations Designating Physical Activities).	2.2 Designated Physical Activities under CEAA 2012	80% (+8 MTPA - from 10 MPTA to 18 MPTA)
2.3.4	A description of the physical activities that are incidental to the designated project.	2.3.2 Project Activities	
2.4	Emissions, discharges and waste Provide a description of any solid, liquid, gaseous or hazardous wastes likely to be generated during any phase of the designated project and of plans to manage those wastes, including the following:	2.3.2 Project Activities	
2.4.1	Sources of atmospheric contaminant emissions during the designated project phases (focusing on criteria air contaminants and greenhouse gases, or other non-criteria contaminants that are of potential concern) and location of emissions.	2.3.2 Project Activities	
2.4.2	Sources and location of liquid discharges.	2.3.2 Project Activities	

Project Description Requirements		Section in this Project Description	Notes
2.4.3	Types of wastes and plans for their disposal (e.g., landfill, licenced waste management facility, marine waters, or tailings containment facility).	2.3.2 Project Activities	
2.5	Construction, operation, decommissioning and abandonment phases and scheduling. Provide a description of the timeframe in which the development is to occur and the key project phases, including the following:	2.4 Project Schedule	
2.5.1	Anticipated scheduling, duration and staging of key project phases, including preparation of the site, construction, operation, decommissioning and abandonment.	2.4 Project Schedule	
2.5.2	Main activities in each phase of the designated project that are expected to be required to carry out the proposed development (e.g., activities during site preparation or construction might include, but are not limited to, land clearing, excavating, grading, de-watering, directional drilling, dredging and disposal of dredged sediments, infilling, and installing structures).	2.3.2 Project Activities	
3.0	Project Location		
3.1	Provide a description of the designated project's location including:		
3.1.1	Coordinates (i.e., longitude/latitude using international standard representation in degrees, minutes, seconds) for the centre of the facility or, for a linear project, provide the beginning and end points.	3 Project Location	
3.1.2	Site map/plan(s) depicting location of the designated project components and activities. The map/plan(s) should be at an appropriate scale to help determine the relative size of the proposed components and activities.	Figures 3-1 & 3-2	
3.1.3	Map(s) at an appropriate scale showing the location of the designated project components and activities relative to existing features, including but not limited to: ♦ watercourses and waterbodies with names where they are known;	Figures 3-1 & 3-2	
	♦ linear and other transportation components (e.g., airports, ports, railways, roads, electrical power transmission lines and pipelines);	Figures 3-1 & 3-2	

Project Description Requirements		Section in this Project Description	Notes
	♦ other features of existing or past land use (e.g., archaeological sites, commercial development, houses, industrial facilities, residential areas and any waterborne structures);	Figures 3-1 & 3-2	
	♦ location of Aboriginal groups, settlement land (under a land claim agreement) and, if available, traditional territory;	Appendix D	
	♦ federal lands[1] including, but not limited to National parks, National historic sites, and reserve lands;	Figures 3-1 & 3-2	
	♦ nearby communities;	Figures 3-1	
	♦ permanent, seasonal or temporary residences;	Figures 3-1	
	♦ fisheries and fishing areas (i.e., Aboriginal, commercial and recreational);	Figures 3-1 & 3-2	Fishing areas are throughout Douglas Channel but Aboriginal fishing areas are not identified at First Nations request
	♦ environmentally sensitive areas (e.g., wetlands, and protected areas, including migratory bird sanctuary reserves, marine protected areas, National Wildlife areas, and priority ecosystems as defined by Environment Canada);	Figure 3-1	
	♦ Provincial and international boundaries.	Figure 3-1	
3.1.4	Photographs of work locations to the extent possible.		
3.1.5	Legal description of land to be used for the designated project, including the title, deed or document and any authorization relating to a water lot.	3 Project Location	
3.1.6	Proximity of the designated project to: ♦ any permanent, seasonal or temporary residences;	3 Project Location	

[1] As defined in CEAA 2012, "federal lands" means
(a) lands that belong to Her Majesty in right of Canada, or that Her Majesty in right of Canada has the power to dispose of, and all waters on and airspace above those lands, other than lands under the administration and control of the Commissioner of Yukon, the Northwest Territories, or Nunavut;
(b) the internal waters of Canada (in any area of the sea not within a province), the territorial sea of Canada (in any area of the sea not within a province), the exclusive economic zone of Canada, and the continental shelf of Canada; and
(c) Reserves, surrendered lands and any other lands that are set apart for the use and benefit of a band and that are subject to the Indian Act, and all waters on and airspace above those reserves or lands.

Project Description Requirements		Section in this Project Description	Notes
	♦ traditional territories, settlement land (under a land claim agreement) as well as lands and resources currently used for traditional purposes by Aboriginal peoples; and,	6.4 Indigenous Engagement and Consultation Activities; Appendix D	
	♦ any federal lands.	Figure 3-1	
3.2	Land and Water Use To the extent that is known at this time, describe the ownership and zoning of land and water that may be affected by the project, including the following.	3 Project Location	
3.2.1	Zoning designations.	3 Project Location	
3.2.2	Current land ownership, including sub-surface rights.	3 Project Location	
3.2.3	Any applicable land use, water use (including ground water), resource management or conservation plans applicable to or near the project site.	Not applicable	
3.2.4	For the proposed construction, operation, decommission and abandonment of a marine terminal, state whether or not the lands are routinely, and have been historically, used as a marine terminal, or are designated for such use in a land use plan that has been the subject of public consultation.	1.5 Regulatory History and Context	
3.2.5	If the project is to take place within the waters or lands administered by a Canada Port Authority under the Canada Marine Act and its regulations. Describe applicable land status and zoning under the Port Land Use Plan.	Not Applicable	
3.2.6	If the designated project is going to require access to, use or occupation of, or the exploration, development and production of lands and resources currently used for traditional purposes by Aboriginal peoples.	1.4 Jurisdictions and Parties Consulted	
4.0	Federal Involvement – Financial Support, Lands and Legislative Requirements		
4.1	Describe if there is any proposed or anticipated federal financial support that federal authorities are, or may be, providing to support the carrying out of the designated project.	4.1 Federal Lands	
4.2	Describe any federal lands that may be used for the purpose of carrying out the designated project. This is to include any information on any granting of interest in federal land (i.e., easement, right of way, or transfer of ownership).	4.1 Federal Lands	

Project Description Requirements		Section in this Project Description	Notes
4.3	Detail any federal legislative or regulatory requirements that may be applicable, including a list of permits, licences or other authorizations that may be required to carry out the designated project.	4.2 Federal Permits and Approvals	
5.0	Environmental Effects		
5.1	A description of the physical and biological setting, including the physical and biological components in the area that may be adversely affected by the project (e.g., air, fish, terrain, vegetation, water, wildlife, including migratory birds, and known habitat use).	5.1 Environmental Setting	
5.2	A description of any changes that may be caused as a result of carrying out the designated project to: (a) fish and fish habitat, as defined in the Fisheries Act;	2.3.2 Project Activities 5.1.4 Marine Resources 5.2.2 Preliminary Effects Assessment of KLNG Expansion Project	
	(b) marine plants, as defined in the *Fisheries Act* ; and,	2.3.2 Project Activities 5.1.4 Marine Resources 5.2.2 Preliminary Effects Assessment of KLNG Expansion Project	
	(c) migratory birds, as defined in the *Migratory Birds Convention Act*, 1994.	2.3.2 Project Activities 5.1.4 Marine Resources 5.2.2 Preliminary Effects Assessment of KLNG Expansion Project	
5.3	A description of any changes to the environment that may occur, as a result of carrying out the designated project, on federal lands, in a province other than the province in which the project is proposed to be carried out, or outside of Canada.	4 Federal Involvement 4.2.1.1 TERMPOL	

Project Description Requirements		Section in this Project Description	Notes
5.4	A description of the effects on Aboriginal peoples of any changes to the environment that may be caused as a result of carrying out the designated project, including effects on health and socio-economic conditions, physical and cultural heritage, the current use of lands and resources for traditional purposes, or any structure, site or thing that is of historical, archaeological, paleontological or architectural significance.	5.2.2 Preliminary Effects Assessment of KLNG Expansion Project 6.2 Potentially Affected Indigenous Communities	
6.0	Proponent Engagement and Consultation with Aboriginal Groups		
6.1	A list of Aboriginal groups that may be interested in, or potentially affected by, the designated project.	6 Proponent Engagement and Consultation with Indigenous Groups	
6.2	A description of the engagement or consultation activities carried out to date with Aboriginal groups, including: ♦ names of Aboriginal groups engaged or consulted to date with regard to the designated project	1.4 Jurisdictions and Parties Consulted 6.4 Indigenous Engagement and Consultation Activities 6.6 Ongoing Engagement and Consultation Activities	
	♦ date(s) each Aboriginal group was engaged or consulted; and	1.4 Jurisdictions and Parties Consulted 6.4 Indigenous Engagement and Consultation Activities5	
	♦ means of engagement or consultation (e.g., community meetings, mail or telephone).	1.4 Jurisdictions and Parties Consulted 6.4 Indigenous Engagement and Consultation Activities	
6.3	An overview of key comments and concerns expressed by Aboriginal groups identified or engaged to date, including any responses provided to these groups.	6.5 Key Issues Identified By Indigenous Groups To Date	

Project Description Requirements		Section in this Project Description	Notes
6.4	An overview of information on current use of lands and resources for traditional purposes by Aboriginal groups or peoples (e.g., information provided verbally or in writing, and past or present studies).	6.3 Current Use of Lands and Resources for Traditional Purposes	
6.5	A consultation and information-gathering plan that outlines the ongoing and proposed Aboriginal engagement or consultation activities, the general schedule for these activities and the type of information to be exchanged and collected (or, alternatively, an indication of why such engagement or consultation is not required). The proponent is encouraged to provide background information on Aboriginal groups' potential or established Aboriginal or treaty rights. The proponent is also encouraged to provide information on the impact area of the designated project and how it overlaps with uses by Aboriginal groups that have potential or established Aboriginal or treaty rights. This information will be used to facilitate the Agency's understanding of the scope of Aboriginal interests in relation to the designated project, including the potential for impacts on Aboriginal rights and issues of concern.	6.6 Ongoing Engagement and Consultation Activities	A consultation plan is being developed
7.0	Consultation with the Public and Other Parties (other than Aboriginal consultation included above)		
7.1	A list of stakeholders that may be interested and potentially affected by the carrying out of the designated project. In addition, please describe consultation activities carried out to date with stakeholders, including: - names of stakeholders previously consulted; - date(s) each stakeholder was consulted; and, - means of consultation (e.g., community meetings, mail or telephone).	7 Consultation with the Public and Other Parties	
7.2	An overview of key comments and concerns expressed to date by stakeholders and any responses that have been provided.	7.4 Key Issues Identified by the Public and Government Agencies	
7.2	An overview of any ongoing or proposed stakeholder consultation activities.	7.5 Ongoing Engagement and Consultation Activities	

Project Description Requirements		Section in this Project Description	Notes
7.3	A description of any consultations that have occurred with other jurisdictions that have environmental assessment or regulatory decisions to make with respect to the project.	7.2 Government Engagement Activities	

1 General Information and Contacts

1.1 Project Summary

The Proponent, KM LNG Operating General Partnership (KM LNG), is proposing the Kitimat LNG Expansion Project (KLNG Expansion Project) at Bish Cove within the District of Kitimat, BC., and on Haisla Nation reserve land. The KLNG Expansion Project is a 50/50 joint venture between Chevron Canada Limited (Chevron) and Woodside Energy International (Canada) Limited (Woodside).

The Kitimat LNG Project (KLNG Project) has been previously authorized to be developed, operated, and decommissioned at the Bish Cove site (see Sections 1.3.1 to 1.3.3). The KLNG Project includes a liquefied natural gas (LNG) plant, marine terminal, power line connecting natural gas pipeline, condensate return pipeline, access road, and the use of existing shipping routes in BC coastal waters. The KLNG Project includes the production, storage, and loading of LNG for marine transportation to overseas markets.

Part of the Bish Cove site is on Bees Indian Reserve (IR) No. 6. All project components (including the LNG plant and storage facility, which are on Bees IR No. 6) were assessed through federal review. Provincial Environmental Assessment (EA) Certificate E06-01 (EAC E06-01) was issued in early 2006, covering those KLNG Project components located outside of Bees IR No. 6. The EAC E06-01 was amended in 2009 to include a project update for the liquefaction of 5 million tonnes per annum (MTPA). By October 2010, the KLNG Project was planned to include two (2) LNG Trains, for a total processing capacity of 10 MTPA. The Haisla Nation approved the lease of Bees IR No. 6 to KM LNG in November 2010, and the lease was subsequently issued by Indigenous and Northern Affairs Canada (INAC) now Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC). The Canadian Environmental Assessment (CEA) Agency subsequently determined in 2013 that no further federal EA review was required for an increase in LNG processing capacity from 5 to 10 MTPA (see Section 1.3.3).

The KLNG Expansion Project comprises the Kitimat LNG Foundation Project (KLNG Foundation Project), which consists of two (2) LNG processing trains, and a potential expansion (Third LNG Train Expansion) that includes an additional LNG processing train (three (3) trains total), LNG tank and LNG loading berth on the KLNG Foundation Project site.

The Proponent is proposing a preferred development concept, which includes an advanced compact module design that enables low-cost operation, high facility efficiency and availability with the lowest physical footprint per unit of LNG production, relative to other recent and proposed comparable global LNG project norms. In addition, the development concept includes an all-electric plant powered by clean, renewable hydroelectricity from BC Hydro, and will set the global standard for the lowest emissions intensity of any large-scale LNG facility. This new compact module, all-electric drive (Compact E-Drive) design has led to step change improvements, including substantial reductions in LNG unit costs, execution risk, and emissions, and more effective utilization of the Bish Cove site. The proposed Compact E-Drive Design has increased the combined two (2) LNG Train output capacity from 10 to 12 MPTA. In this design, approximately 212 m^3/d of condensate product will be recovered from the feed gas and piped off site for export via rail, which is an increase of 35.6 m^3/d over the 10 MTPA design.

The Third LNG Train Expansion involves the future addition of a Third LNG Train on the existing KLNG Foundation Project site, with supporting utilities and infrastructure, to achieve a total output capacity of 18 MTPA (the KLNG Expansion Project). The proposed Third LNG Train Expansion will result in an increase in condensate product export from approximately 212 to 318 m^3/d.

The CEA Agency have advised the Proponent that the increase in project capacity from 10 to 18 MTPA (+80%) constitutes a designated activity under section 15(d) of the Regulations Designating Physical Activities as "an expansion of a facility for the liquefaction, storage or regasification of liquefied natural gas that would result in an increase in the liquefied natural gas processing … capacity of 50% or more …". **Accordingly, this Project Description is being submitted for Screening under CEAA 2012 to determine if a further federal EA is required for the Kitimat LNG Expansion Project.**

Additionally, the potential effects of the proposed changes from the previously provincially approved project are being assessed in support of an application to amend the provincial EA certificate that authorizes the development of project components located on provincial Crown land (EAC E06-01 Amendment #3). It is anticipated that federal agencies will be among those participating on a Technical Working Group to be established for the review of EAC E06-01 Amendment #3.

1.2 Proponent Contact

KM LNG is the Proponent and current Holder of EAC E06-01. Chevron and KM LNG are co-venturers in the development of the KLNG Project. The KLNG Project is operated by Chevron. Primary and alternate proponent contact information is provided in Table 1-1.

Table 1-1 KLNG Project Contact Information

Project Name:	Kitimat LNG Expansion Project
Proponent Name:	KM LNG Operating General Partnership (KM LNG)
Proponent Address:	c/o Chevron Canada Limited 500 - Fifth Avenue SW, Calgary, AB T2P 0L7
Chief Executive Officer or equivalent:	Frank Cassulo, (President, Chevron Canada Limited)
Principal Contact:	Darcy Janko, Regulatory and Compliance Manager Chevron Canada Limited Tel: 403 234 5035 Email: darcyjanko@chevron.com
Alternate Contact:	Michelle Gilders, Regulatory & Environmental Lead Chevron Canada Limited Tel: 403 234 5092 Email: michellegilders@chevron.com

1.3 Regulatory History and Context

A history of the project EA approvals, amendments and related decisions are described in the following sections.

1.3.1 2005 Assessment

In 2005 and 2006, the KLNG Project was subject to a Harmonized Federal-Provincial EA Review, resulting in the preparation of a Joint Assessment Report/Comprehensive Study Report. The EA review concluded the proposed KLNG Project was not likely to result in significant adverse effects.

The EAC E06-01 was issued on June 1, 2006 under the BCEAA, S.B.C. 2002, c. 43 to Kitimat LNG Inc. (the former Proponent) for the KLNG Project. The KLNG Project was reviewed under BCEAA since the proposed marine facilities were on provincial Crown land and would result in a direct physical disturbance of greater than and equal to 2 hectares (ha) of marine coastal foreshore and submerged land. The EAC E06-01 authorized the former Proponent to construct, operate and decommission an LNG import terminal at Bish Cove.

The EAC E06-01 is limited to project components located on provincial Crown land, namely the marine terminal facilities, and rights-of-ways for the access roads, ancillary areas and facilities, pipelines and power transmission line. Project components located on Haisla Nation's Bees IR No. 6 are authorized under federal legislation.

The KLNG Project received a federal EA decision under the *Canadian Environmental Assessment Act*, S.C. 1992, c. 37 (former CEAA) on August 1, 2006 (CEAR# 05-03-10430). Following this decision, the CEA Agency referred the KLNG Project to the responsible authorities (i.e., Transport Canada, Environment Canada and INAC) for appropriate action under section 7 of the former CEAA. Transport Canada, Environment Canada (now referred as Environment and Climate Change Canada [ECCC]) and INAC issued their course of action decisions on the KLNG Project on January 25, 2007. In addition, Fisheries and Oceans Canada (DFO) issued a positive EA decision on the KLNG Project on March 20, 2008, as a result of a screening under the former CEAA.

1.3.2 2008 Assessment

In 2008, the KLNG Project was revised to include either natural gas "regasification or liquefaction" processing facilities to allow for either import or export of LNG.

On December 10, 2008, the CEA Agency determined that this change would not require further assessment or federal EA review.

The EAC E06-01 was amended on January 8, 2009 to reflect this change.

1.3.3 2009 to 2015

On January 13, 2010, EAC E06-01 was transferred to KM LNG.

In November 2010, the Haisla Nation voted to approve the lease of Bees IR No. 6 for the KLNG Project. A two (2) LNG Train 10 MTPA facility was being contemplated at that time. No additional lands, new infrastructure or additional federal approvals were determined to be required for the increase in production capacity to 10 MTPA; therefore, no additional federal EA was required at that time. The Proponent subsequently commissioned Front-End Engineering Design (FEED) for a two (2) LNG Train 10 MTPA liquefaction facility.

Federal approvals acquired during this period included:

- Timber Permit from INAC for clearing of the facility site on April 8, 2011.
- Non-Metallic Minerals Approval from INAC for removal of material from Bees IR No. 6, on March 16, 2012.

- *Navigable Waters Protection Act* approvals from Transport Canada for construction related infrastructure, including the access road bridge over Bish Creek, barge landing facilities, and a site access jetty between July 2011 and January 2012.
- A 20-year export license from the National Energy Board (NEB) to serve international markets from a 10 MTPA facility on November 14, 2011.
- *Fisheries Act* authorization from DFO for impacts to fish habitats associated with the KLNG Project (marine, facility, access road and interconnecting infrastructure) on December 1, 2011.

The CEAA 2012 came into force on July 6, 2012. Section 128 (Non-application of this *Act*) of CEAA 2012 contains the following transition provision:

> *This Act does not apply to a project, as defined in the former Act, that is a designated project as defined in this Act, if one of the following conditions applies:*
>
> *a. the proponent of the project has, before the day on which this Act comes into force, initiated the construction of the project;*
>
> *b. it was determined by the Agency or a federal authority under the former Act that an environmental assessment of the project was likely not required;*
>
> *c. the responsible authority has taken a course of action under paragraph 20(1)(a) or (b) or subsection 37(1) of the former Act in relation to the project; or*
>
> *d. an order issued under subsection (2) [Minister's powers] applies to the project.*

On March 15, 2013, KM LNG requested confirmation from the CEA Agency that the planned two (2) LNG Train 10 MTPA facility would not require further review under CEAA 2012. On April 19, 2013, the CEA Agency advised that, pursuant to the Section 128 transitional provisions of CEAA 2012, the planned 10 MTPA capacity did not require further review.

On September 3, 2015, the BCEAO determined that the KLNG Project had been substantially started. As a result, EAC E06-01 remains in effect for the life of the KLNG Project, subject to the Minister of Environment's (the Minister) power to cancel and suspend an EA certificate due to non-compliance.

1.3.4 Project Terminology

- **Kitimat LNG Project** or **KLNG Project** – The general generic name for the overall Kitimat LNG project in all of its various forms and iterations over time. This term does not distinguish between what has received regulatory approval or not.
- The **KLNG Approved Project** – The name for the Kitimat LNG Project design associated with the current 10 MTPA project.
- **2019 KLNG Expansion Project** – The name being used for the current regulatory review for the new project elements only—for which approval is now being sought. This has two aspects:
  - the **KLNG Foundation Project** - The name for the change from 10 to 12 MTPA using 2 optimized compact e-drive LNG trains, the land backed wharf, decreased LNG storage capacity, and some incremental marine shipping; and
  - the **Third LNG Train Expansion** – The name for the change from 12 to 18 MTPA by adding a third LNG Train, a second LNG loading berth and an LNG storage tank on the existing KLNG Foundation Project site, and additional marine shipping.

1.3.5 2019 Kitimat LNG Expansion Project

The Kitimat LNG Expansion Project will consist of two proposed phases that both utilize the Compact E-Drive Design:

1. Kitimat LNG Foundation Project (Compact E-drive Design) - two (2) LNG Train foundational development with output capacity of 12 MTPA; and
2. Third LNG Train Expansion (also a Compact E-drive design) – addition of a third LNG Train (associated infrastructure for LNG storage, loading and shipping) for a total output capacity of 18 MTPA.

The Kitimat LNG Expansion Project requires an amendment to the provincial EAC E06-01, for which the proponents are preparing to apply. The EAC E06-01 authorizes KLNG Project components on provincial Crown land (i.e., marine terminal facilities and rights of way for the access road, pipelines and hydro transmission lines). Project components located on Haisla Nation's Bees IR No. 6 (i.e., LNG processing and storage facilities) are authorized under federal legislation. It is anticipated that federal agencies will be among those participating on the Technical Working Group to be established to review the provincial certificate amendment application, as well as involved in federal permitting required for the KLNG Expansion Project to proceed.

1.3.5.1 Kitimat LNG Foundation Project (Compact E-drive Design)

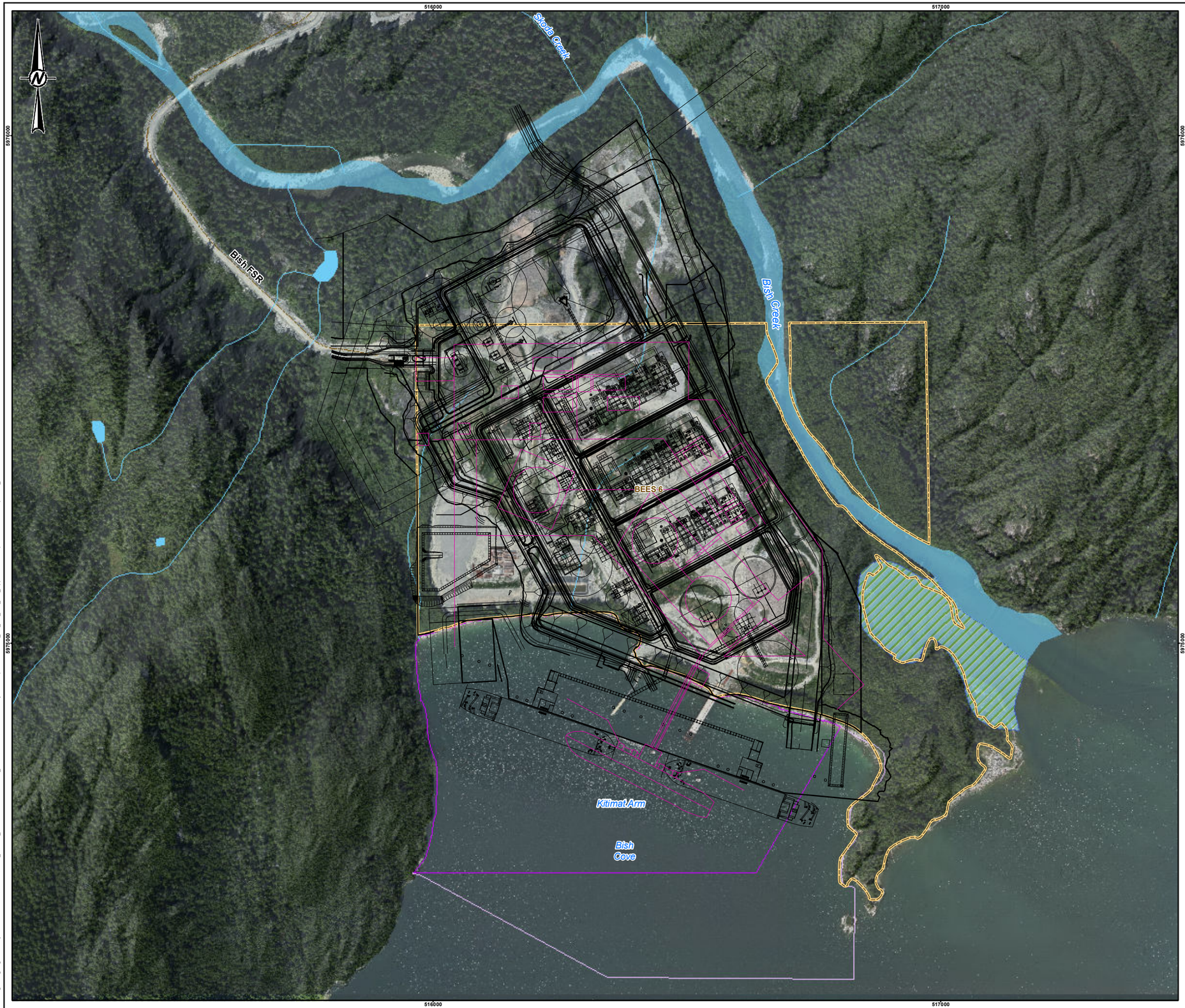
The two (2) LNG Train foundational development will have an output capacity of 12 MTPA and will utilize the Compact E-Drive Design. Further design optimizations have been identified that reflect improvements from environmental, safety, financial, constructability, and operability perspectives, including:

- Optimized LNG storage configuration,
- Optimized design of the marine terminal as a Land Backed Wharf (LBW); and
- Additional marine traffic of 30 to 50 LNG carriers per year.

1.3.5.2 Third LNG Train Expansion

The proposed Third LNG Train Expansion is to support the addition of a third LNG Train to increase processing capacity from 12 to 18 MTPA and will utilize the Compact E-Drive Design. The proposed expansion involves the following changes:

- The addition of a third LNG Train within the existing site footprint to increase processing capacity from 12 to 18 MTPA;
- The addition of a full containment tank of up to 130,000 m^3, for a combined total LNG storage of up to 390,000 m^3, which is within the previously authorized storage capacity of 420,000 m^3;
- The addition of a second LNG loading berth on the LBW to support the capacity of three (3) LNG Trains; and
- Additional marine traffic of 75 to 85 LNG carriers per year beyond the Kitimat LNG Foundation Project.



LEGEND

- FACILITY LAYOUT
- PLOT PLAN (2008)
- EXISTING FORESHORE LEASE AREA
- PROPOSED FORESHORE LEASE AREA

BASE DATA

- FOREST SERVICE ROAD (FSR)
- WATERCOURSE
- WATERBODY
- WETLAND
- FIRST NATION RESERVE

0 100 200

1:7,500 METRES

REFERENCES

1. EXISTING AND PROPOSED STUDY AREA DIGITIZED FROM MAPPING PROVIDED BY CHEVRON.
2. FOREST SERVICE ROADS, HYDROLOGY, PARKS AND PROTECTED AREAS CONTAINS INFORMATION LICENSED UNDER THE OPEN GOVERNMENT LICENSE – BRITISH COLUMBIA.
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5. IMAGERY PROVIDED BY CHEVRON.

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CLIENT
CHEVRON CANADA LIMITED

PROJECT
KITIMAT LNG EXPANSION PROJECT

TITLE
APPROVED KLNG PROJECT AND PROPOSED KLNG EXPANSION PROJECT PLANT SITE GENERAL ARRANGEMENT

Kitimat LNG

YYYY-MM-DD	2019-07-07
DESIGNED	AC
PREPARED	RC
REVIEWED	AC
APPROVED	DK

PROJECT NO.	CONTROL	REV.	FIGURE
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2 Project Information

2.1 Project Purpose and Rationale

Global energy demand is projected to rise more than 25% by 2040, driven by a growing global population and rising middle class (International Energy Agency (IEA) World Economic Outlook 2017, New Policies Scenario). Increasingly, fuel switching between coal and natural gas is reducing the carbon intensity of global energy use. Natural gas demand as a percentage of global energy demand is expected to increase over this period, even in the most aggressive IEA low carbon scenarios. The LNG demand is expected to substantially increase over this period, including a 47% increase by 2025 over the 2017 market (source: Wood Mackenzie), driven largely by the Asia Pacific region. The KLNG Project is positioned to help meet this increase in demand with gas resources from Western Canada. The LNG shipping distance from north-west BC to Asia is relatively short with a direct voyage across the Pacific Ocean.

In response to the 2015 decline in global LNG prices, the KLNG Project co-venturers reassessed a range of LNG plant design alternatives over the 2015-2018 period to improve the project's unit cost competitiveness, execution, operability and environmental performance. These alternatives included the number and capacity of LNG trains, liquefaction technologies, refrigeration compression drive technologies, power sources, process cooling technologies, LNG storage technology and capacity, and plant and marine facilities layouts including floating LNG concepts. The selected LNG plant concept from this work delivers the highest overall value of alternatives evaluated when considering criteria including LNG development unit cost and schedule, safety, health and environmental impact, technology and execution risks, and plant operability and reliability of LNG delivery.

2.1.1 GHG Performance and Footprint

In alignment with the Clean BC Strategy (BC Government 2018), the Kitimat LNG Expansion Project leverages the local availability of clean renewable energy from BC Hydro as well as new, all electric drive technology to achieve the lowest emissions intensity of any large-scale LNG facility in the world. As shown in Figure 2-1, the KLNG plant will outperform current best-in-class global LNG plants and the more stringent Government of BC's LNG intensity benchmark. Kitimat LNG provides the opportunity to reduce global GHG emissions by approximately 57 million tonnes annually if used to displace coal fired electricity generation in Asia. This exceeds BC's 2030 reduction target of 25.4 Mt and is approximately 8% of Canada's total 2016 emissions.

The Compact E-drive Design will also have the lowest area footprint per unit of LNG production at full build out relative to other recent and proposed global land-based LNG project. The industry range globally is 7 to 18 ha/MTPA whereas the Kitimat LNG Project is expected to be 5 ha/MTPA.

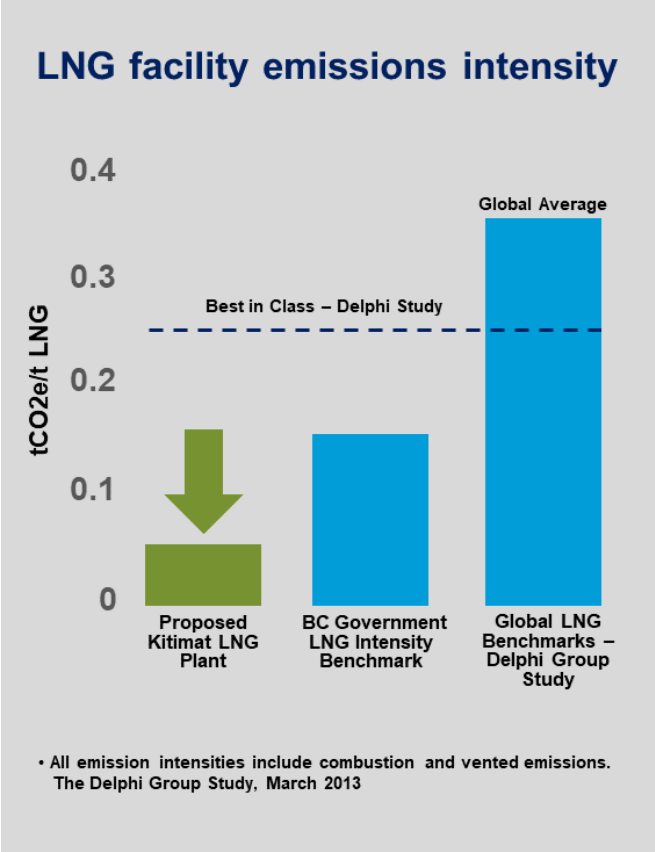


Figure 2-1: KLNG Project GHG Performance Comparison

2.2 Designated Physical Activities under CEAA 2012

This Project Description has been designed as the basis for the purpose of screening the proposed project expansion under the CEAA 2012 to determine whether a federal EA is required.

In relation to the 10 MTPA KLNG Project considered by the CEA Agency in 2013 (see Section 1.3.3), the 18 MTPA KLNG Expansion Project represents an 80% increase in average annual LNG processing capacity (i.e., +8 MTPA).

The CEA Agency has advised that the KLNG Expansion Project from 10 to 18 MPTA constitutes a designated activity under section 15(d) of the Regulations Designating Physical Activities as “an expansion of a facility for the liquefaction, storage or regasification of liquefied natural gas that would result in an increase in the liquefied natural gas processing or storage capacity of 50% or more and a total liquefied natural gas processing capacity of 3 000 t/day or more or a total liquefied natural gas storage capacity of 55 000 t or more”.

Incremental changes to marine shipping of LNG has been identified as a physical activity incidental to the expansion. It has not yet been decided whether the Proponent will operate their own fleet of LNG carriers or if LNG carriers will be operated by a third party with custody of the LNG transferred upon loading. In either case, the Proponent will have the ability to require specific mitigation measures by the LNG carriers.

2.3 Project Components and Activities

The following sections describe project components and activities associated with the entire KLNG Project, inclusive of the Compact E-drive Design phase and the Third LNG Train Expansion to 18 MTPA.

2.3.1 Project Components

The KLNG Expansion Project will consist of a foundational project of two (2) LNG trains (KLNG Foundation Project), with optimized capacity of 12 MTPA, with an option to add a third LNG Train (Third LNG Train Expansion) with supporting utilities, LNG product storage, a marine terminal, and other permanent and temporary infrastructure, to increase the capacity to 18 MTPA. The KLNG Plant will be supplied with natural gas from the Pacific Trail Pipeline (PTP) which will provide a connection to Western Canada's natural gas supplies.

The KLNG Plant intends to use the Dual Mixed Refrigerant (DMR) liquefaction process (Figure 2-2) optimal for maximizing annual LNG production in colder climates. The KLNG Project facilities are divided into the four (4) main areas:

1. **Inside Battery Limits (ISBL) Area - overall footprint of 12 ha** – consists of up to three (3) LNG Trains and are all located within Bees IR No. 6.

2. **Outside Battery Limits (OSBL) Area overall footprint of 27 ha** – facilities and utilities are located within Bees IR No. 6, except for the flare, acid gas incinerator, and part of the fire water pumps and tanks, which are all located on provincial Crown land (of 7 ha) contiguous with IR No.6.

3. **LNG Storage and Loading overall footprint of 21 ha**– a full containment storage tank of 260,000 m^3 net working volume, cryogenic loading lines, vapour return lines and LNG loading facilities at a single berth on the LBW in Bish Cove for a two (2) LNG Train development for the foundation project. Addition of a second full containment LNG tank (estimated 130,000 m^3 net working volume) and second LNG loading berth on the LBW would be required to support the increased production at full build-out from three (3) LNG Trains.

   The LNG Storage facilities are located within Bees IR No. 6 while loading occurs within the Foreshore Lease area.

4. **Other Offsite Facilities**

   - Facilities at **Area A with an overall footprint of 35 ha** include the Central Control Room, crew room, loading room, security and emergency response buildings, operations camp, and turn around camp.
   - Approximately 16.7 km natural gas and condensate pipeline to/from LNG Plant site.
   - Approximately 17 km high-voltage overhead power transmission line from the Minette Substation in Kitimat will supply power to the KLNG Plant site at Bish Cove.
   - Plant access via the existing Bish Cove FSR of 16.87 km, and a proposed secondary access road and bridge of ~500 m length.

The KLNG Expansion Project will utilize electric motor drive technology (total capacity of ~700 MW) for all liquefaction process and utility compressors, pumps and fans, and will purchase power from BC Hydro

reducing the need for an onsite natural gas-powered generation facility (four [4] 2.5 MW, 13.8 kV diesel powered back-up power generation units will be installed for essential power for emergency and critical loads when the main power is not available in extraordinary circumstances). The optimized layout of the LNG trains, common facilities and utilities have all been modularized to a high degree, with a focus on constructability as well as considering safety, operations and maintenance. The site development will reduce the amount of material for disposal by making effective use of excavated rock to construct a LBW along the foreshore in Bish Cove. The LBW will provide construction laydown space, LNG loading and material offloading functionality, and marine logistic support.

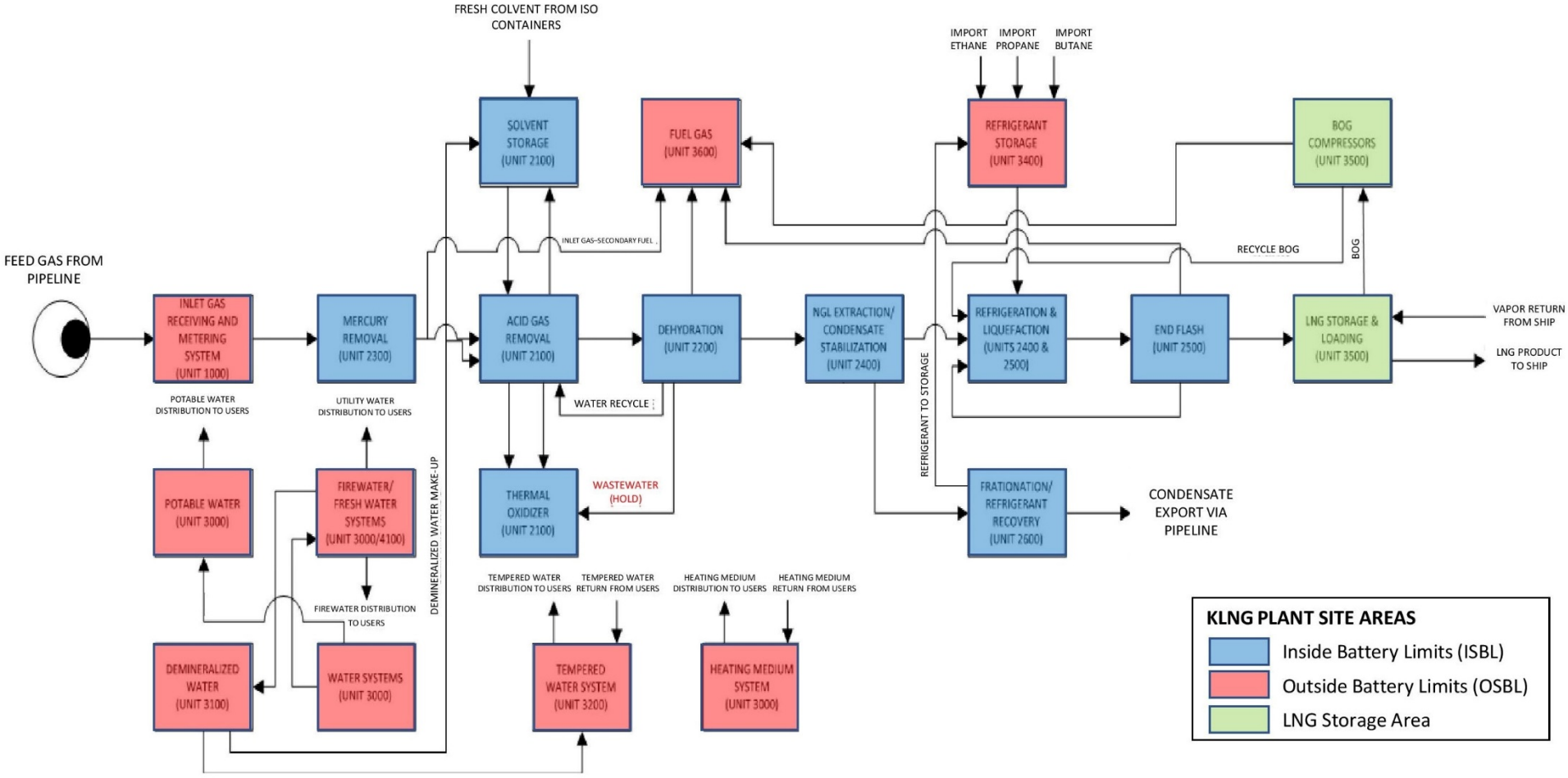


Figure 2-2: KLNG Project Dual Mixed Refrigerant (DMR) liquefaction process diagram.

2.3.2 Project Activities

2.3.2.1 Construction

Construction activities will include:

1. Site preparation (land-based) to create suitable levels for facility construction – underway since 2011[2];
2. Site drainage, roads and paving (see Section 2.3.2.1.1);
3. Onshore modular construction (see Section 2.3.2.1.2);
4. Marine construction, including the Land-Backed Wharf (see Section 2.3.2.1.3);
5. Disposal at sea (see Section 2.3.2.1.4);
6. Waste management (see Section 2.3.2.1.5);
7. Vehicle and rail traffic (see Section 2.3.2.1.6);
8. Shipping materials by barge and other vessels (see Section 2.3.2.1.7); and
9. Commissioning and start-up, including processing units, common utilities, loading and shipping facilities (see Section 2.3.2.1.8)

Following the completion of site preparation activities, foundations and underground services will be installed at an initial grade and then back-filled to final grade. Module foundations will be standardized to optimize construction efficiency.

The Third LNG Train Expansion primary construction activities will be confined to items 3, 6, 7 and 9 listed above.

2.3.2.1.1 Site Drainage, Roads and Paving

Installation of the drainage system will be performed during site preparation prior to module installation. Limited excavation will be required for some deep drains and culverts. Where needed, permanent concrete-lined drainage channels will be installed after module installation.

Clean surface run-off water will be collected and conveyed to a sedimentation pond prior to discharge to Bish Cove. The sedimentation pond collects all run-off water from the LNG train and utilities areas, including the LNG tank and plant flare areas.

Some site roads (e.g., heavy haul road) are expected to be constructed and paved prior to module installation. However, most of the limited paving planned will be installed after module installation. The extent of concrete paving will be less than a conventional LNG plant since the modules will be constructed with working decks, including spill containment.

[2] On September 3, 2015, the BCEAO determined that the KLNG Project had been substantially started.

2.3.2.1.2 Onshore Construction

Building the LNG components will include additional onshore construction of:

- Foundations for modules, buildings, stick-built equipment, pipe-racks and tanks, including installation of piles where required;
- Natural gas treatment facilities, and condensate stabilization and storage facilities;
- Natural gas liquefaction facilities (including natural gas liquefaction trains, refrigeration compressors, and relevant infrastructure);
- Two (2) LNG Trains (6 MTPA per Train), with optional expansion of a third (3rd) LNG Train (18 MTPA at full build-out);
- Common utilities, piping and cabling;
- Facility piping, and facility site flare system;
- LNG storage, loading and circulation system; and
- Ancillary buildings and workforce accommodation.

2.3.2.1.3 Land-Backed Wharf

An LBW, with size of approximately 147 m wide by 1 km in length, will be constructed along the foreshore in Bish Cove, adding approximately 15 ha of useable land to the site. Fill for the LBW will be sourced from the KLNG Plant site area. The LBW will provide LNG loading and materials offloading functionality, and the LBW will also enable delivery of materials, modules and equipment during operations period from ships and barges. It will also provide materials laydown and temporary facilities for turnarounds that are located away from "live" operating plant. The KLNG marine terminal will be developed within an expanded 33 ha foreshore lease area within Bish Cove. Due to the deep water in Bish Cove, only limited dredging (volume to be determined) is expected to facilitate the construction of the LBW.

2.3.2.1.4 Disposal at Sea

The initial project design required approximately 3 Mm^3 of rock to be removed from site and disposed of at sea. With the optimized site configuration the volume of rock removal has been reduced and will now be utilized for the construction of the LBW. The material that requires DAS consist of marine clays that will not support facility infrastructure and cannot be placed in upland locations.

Disposal at sea is proposed to occur over a period of approximately 12 to 24 months subject to permit conditions and requirements. The work method will consist of land-based, water surface and in-water works that will be executed simultaneously as follows:

- Removal/excavation of material above design level (land-based works);
- Marine and/or slurry pump transport from the excavation site to the disposal site (land-based works, water surface works, and marine disposal (in-water works).

2.3.2.1.5 Waste Management

Solid wastes from the construction camp will be removed from the site and recycled or disposed of at an existing approved landfill facility at the Project's existing industrial site in Kitimat, in compliance with applicable regulatory requirements.

Each waste type to be transferred from the KLNG Project site will be manifested. The manifest establishes the necessary action to control the transfer of waste from the KLNG Project site.

Sewage effluent will be treated onsite using a wastewater treatment system capable of handling workforce accommodations and on-site buildings. Hazardous wastes generated during construction will be disposed of offsite at an approved disposal facility in compliance with applicable regulatory requirements.

2.3.2.1.6 Vehicle Traffic

During construction, workers will be transported between the Northwest Regional Airport (during crew changes) and workforce accommodations and the LNG facility by buses or other suitable crew transportation methods. Due to the proposed location(s) of the potential workforce accommodation centre(s), buses transporting workers between the workforce accommodation centre(s) and LNG facility are not anticipated to travel through municipalities.

2.3.2.1.7 Shipping Materials

Facility components and LNG processing modules will be delivered by barge or another large vessel (e.g., Roll-On-Roll-Off marine transportation vessel) to the LBW. Construction materials, supplies, and equipment may also be delivered to the KLNG Plant site by transport truck and to the Kitimat area by truck or rail.

2.3.2.1.8 Start-Up

Start-up involves bringing the LNG processing units into operation one at a time until full and stable operation is established. Once operational, the output of the LNG facility will be gradually brought up to full capacity as per design. The proposed DMR process design does not require an initial cooling down of the LNG process units, storage tanks and pipe work. The LNG facility will follow structured systems commissioning and testing approach to ensure a safe and controlled start-up.

During commissioning and start-up, there may be several weeks of almost continuous flaring while systems are tested to ensure safe operations. The LNG facility is being designed to accommodate commissioning procedures that enable this period to be minimized.

2.3.2.2 Operations

The operation phase is estimated to last approximately 40 years. At full build-out, the KLNG Project will be capable of producing approximately 18 MTPA of LNG.

2.3.2.2.1 LNG Production and Storage

The LNG production includes natural gas treatment, cooling and compression and LNG storage and loading. Extracted condensate will be exported by rail.

2.3.2.2.2 Waste Management

Wastes generated during operation include facility emissions and solid wastes, stormwater, hazardous wastes, and waste generated by LNG carriers. Solid waste from the new facility buildings that cannot be recycled will be removed from the site and transported to appropriate disposal sites.

2.3.2.2.3 LNG Carrier Loading & Shipping

The marine terminal will transfer LNG to LNG carriers up to and including Q-Flex sized vessels (217,450 m^3 capacity).

One (1) LNG loading berth, inclusive of breasting dolphins, located outboard of LBW will support a two (2) LNG Trains (12 MTPA) development, representing approximately 150 to 170 LNG carriers arriving and departing each year. A second LNG loading berth will support the capacity of three (3) LNG Trains (18 MTPA) full build-out option, representing up to 225 to 255 LNG carriers arriving and departing each year.

The LNG carriers' entrance from the open sea is via the Dixon Entrance near the south tip of Alaska, with the approach to pilot boarding station near Triple Island, west of Prince Rupert, and then proceeding on the 296 km transit to Bish Cove. The route provides wide and deep channels with narrowest width being 1.4 km and the shallowest depth is 35 m. Estimated time of transit from Bish Cove to Triple Island is 12 to 18 hours depending on area and conditions.

2.3.2.3 Decommissioning

Decommissioning will be required at the end of the LNG facility's life. Decommissioning will be in accordance with the laws, regulations, lease agreements and standards in effect at the time. There are currently no regulations for decommissioning of LNG facilities in BC.

At the end of the KLNG Project's life, a Decommissioning Management Plan (DMP) will be developed in consultation with the District of Kitimat and relevant regulatory agencies and potentially affected Indigenous Nations.

Some marine infrastructure may remain in place, subject to discussion with the Haisla First Nation, the District Municipality of Kitimat and adjacent industrial neighbours at the time of decommissioning.

2.4 Project Schedule

An application to amend EAC E06-01 to reflect the proposed KLNG Expansion Project is anticipated to be submitted to the BCEAO for review by Q1 2020. All required approvals are anticipated to be in place by Q3 2021 to enable the commencement of early works and site preparation activities in advance of a final Investment Decision (FID)

The planning basis for FID for the KLNG Foundation Project is late 2023; however, the actual FID date may be sooner or later depending on commercial, regulatory, and technical progress. FID for the Third LNG Train Expansion will follow at a later date to be determined by market considerations. Project execution duration from FID to first LNG cargo will range from 4.5 to 7 years. Operations are planned for 40 years, followed by decommissioning of the facilities. The Project Schedule is shown in Table 2-1.

Table 2-1 Estimated Project Schedule

Project Component	Estimated Timing
Engineering and Technical Studies/Investigations	2018 to 2022
Environmental Assessment/Permitting Process	2019 to 2021
Final Investment Decision	2022 to 2023
Construction of Phase 1	2022/23 to 2028/29
Commissioning of first LNG train	Begins after construction is complete
Commissioning of 2nd LNG train	Begins 3 weeks after the Commission of 1st train
Construction and commissioning of the 3rd LNG train	As market conditions allow
Operations	40 years
Decommissioning	At end of facility operations

3 Project Location

The KLNG Expansion Project is located at Bish Cove approximately 14 km south of the Town of Kitimat in north western BC in an area with historical, existing, and proposed industrial development, including the operating Rio Tinto aluminium smelter and the LNG Canada project (currently under construction). All KLNG Expansion Project components are located within the asserted traditional territory of the Haisla Nation and within the District Municipality of Kitimat in the Regional District of Kitimat-Stikine (Figure 3-1). The closest permanent, seasonal or temporary residences (Kitamaat Village) are located approximately 9 km from the KLNG Expansion Project site at Bish Cove. See Appendix C for photographs from the various site locations.

The locations of proposed onsite (53.927 degrees North, -128.75 degrees West) and offsite project areas and ancillary facilities are shown in Figures 3-2 and 3-3. The KLNG Expansion Project is located within the Kitimat airshed and the approved KLNG Project was considered as part of a regional effects assessment of Kitimat airshed emissions, prepared for the Ministry of Environment and Climate Change Strategy (ECCS) in 2014/2015.

Bish Cove is located on the north shore of Kitimat Arm near the head of the Douglas Channel, a fjord extending 213 km inland from the Pacific Ocean on British Columbia's north coast. The bathymetry of Bish Cove offers relatively deep-water close to the foreshore, eliminating the need for a long jetty, or channel dredging to provide safe navigable access for LNG carriers and heavy lift ships. The area is designated for industrial use in the Kalum Land and Resource Management Plan (BC Government 2002). Natural gas liquefaction trains and LNG storage facilities are located on Bees IR No. 6, which has been designated for commercial industrial use and leased from the Haisla Nation. Gas receipt and some ancillary facilities (*e.g.*, flare, acid gas incinerator, partial firewater tanks and pumps) are located on Provincial Crown land north of Bees IR No.6. The marine facilities are located in Bish Cove.

The Kitimat LNG Area is made up of nine (9) parcels of land and one (1) water lot and the ownership is as summarized in Table 3-1. The ownership is follows:

- The main KLNG Plant Site is situated on Haisla Nation Bees IR No.6 comprising approximately 71 ha. The KLNG Project holds a commercial lease with the Haisla Nation (administered by the Government of Canada) for these core lands;
- The foreshore area adjacent to the Plant Site is leased from Province of British Columbia;
- The West and North East Logistics Areas adjacent to the main Plant Site on Bees IR No.6. These lands are controlled by the Province of British Columbia;
- Area A and Area A2 are north of the main Plant Site and are intended to contain the main operations, housing and logistics infrastructure to support construction and then operation of the KLNG facility. These lands are currently controlled by the Province of British Columbia; and
- Borrow/Storage Pit and Areas G/H/L are intended to support the construction execution of the KLNG Plant facility and are for temporary use. These lands are controlled by the Province of British Columbia.

The Foreshore Lease will be expanded to accommodate the planned Land Back Wharf. In addition, it is the intention of the Haisla Nation to take over ownership and administration of the Foreshore Lease from the Government of BC. The KLNG Project is in support of this intention by the Haisla Nation.

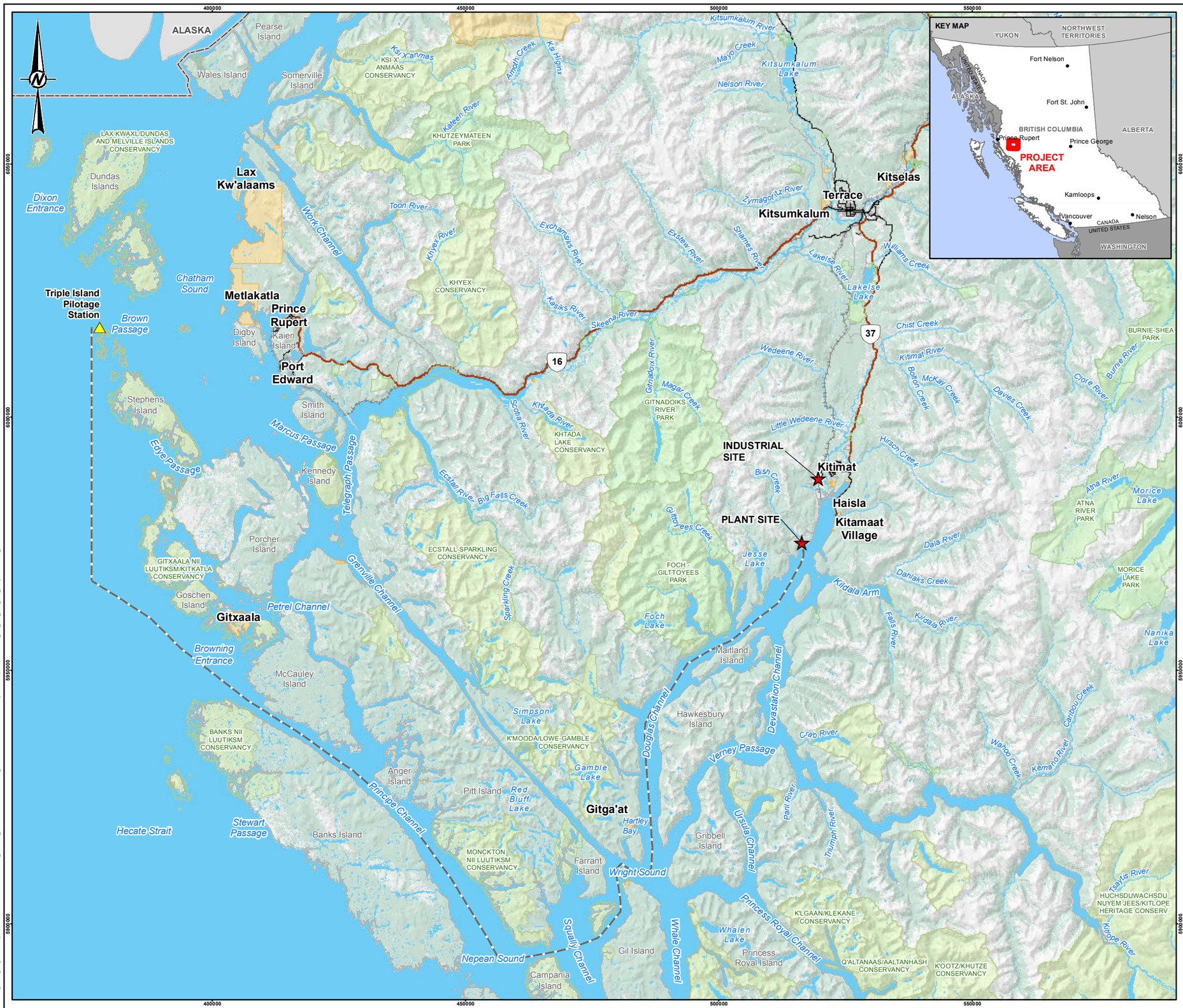
The additional lands adjacent to the Bees IR No.6 Plant site are controlled by the District of Kitimat. The Haisla Nation also intends to purchase these lands from the District and lease to the KLNG Project. The

KLNG Project supports this plan by the Haisla Nation. Further support is provided by agreement as the KLNG Project holds first option to lease these additional lands from the Haisla Nation. The LNG will be exported to overseas markets in LNG carriers. The marine access route is from the BC Coast Pilots boarding zone near the Triple Island Pilotage Station through Principe Sound and Douglas Channel to Kitimat Arm, as shown in Figure 3-1.

Several offsite facility locations are proposed for laydown, storage, logistics, accommodations or other ancillary purposes. A high-voltage overhead power transmission line, approximately 16 km long, will extend BC Hydro's power grid from the Minette Substation to the KLNG Project Plant site at Bish Cove.

Table 3-1 KLNG Expansion Project Lands

No.	Land Item	Type	Owner/ Administrator	Hectares	Land Description
1	BEES IR #6	Treaty	Haisla Nation/ Government of Canada	71	Lots 1, 3, 4 Plan 96252 Lots 2-1 & 202 Plan 97774
2	Existing Foreshore Lease	Water Lot	Province of BC	33	DL3243 Range 4 Coast District
3	West Logistics Area	Fee Simple	Province of BC	1	A-011-K Group 103-H-15
4	North East Logistics Area	Fee Simple	Province of BC	16	Unit 20 Block J Group 103-H-15
5	Area A/A2	Fee Simple	Province of BC	35	Unit 21/22 Block K Group 103-H-15 Unit 21 Block K Group 103-H-15
6	Borrow Pit	Fee Simple	Province of BC	4	Unit 21 Block K Unit 30 Block J Group 103-H-15
7	Storage Pit	Fee Simple	Province of BC	1	Unit 21 Block K Group 103-H-15
8	Area G	Fee Simple	Province of BC	8	Unit 28 Block J Group 103-H-15
9	Area H	Fee Simple	Province of BC	11	Unit 29 Block J Group 103-H-15
10	Areal L	Fee Simple	Province of BC	10	Unit 29 & Unit 39 Block J Group 103-H-15



LEGEND

PROJECT DATA

- KITIMAT LNG (PLANT AND INDUSTRIAL SITE)
- PROPOSED SHIPPING ROUTE

BASE DATA

- PILOTAGE STATION
- HIGHWAY
- MAJOR ROAD
- LOCAL ROAD
- RAILWAY
- INTERNATIONAL BOUNDARY
- WATERCOURSE
- WATERBODY
- FIRST NATION RESERVE
- CONSERVANCY AREA
- PARKS AND PROTECTED AREAS
- VEGETATION

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REFERENCE(S)

1. FOREST SERVICE ROADS, HYDROLOGY, PARKS AND PROTECTED AREAS CONTAINS INFORMATION LICENSED UNDER THE OPEN GOVERNMENT LICENSE – BRITISH COLUMBIA.
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CLIENT
CHEVRON CANADA LIMITED

PROJECT
KITIMAT LNG EXPANSION PROJECT

TITLE
KLNG PROJECT LOCATION

Kitimat LNG

YYYY-MM-DD	2019-07-07
DESIGNED	DK
PREPARED	RC
REVIEWED	AC
APPROVED	DK

PROJECT NO.	CONTROL	REV.	FIGURE
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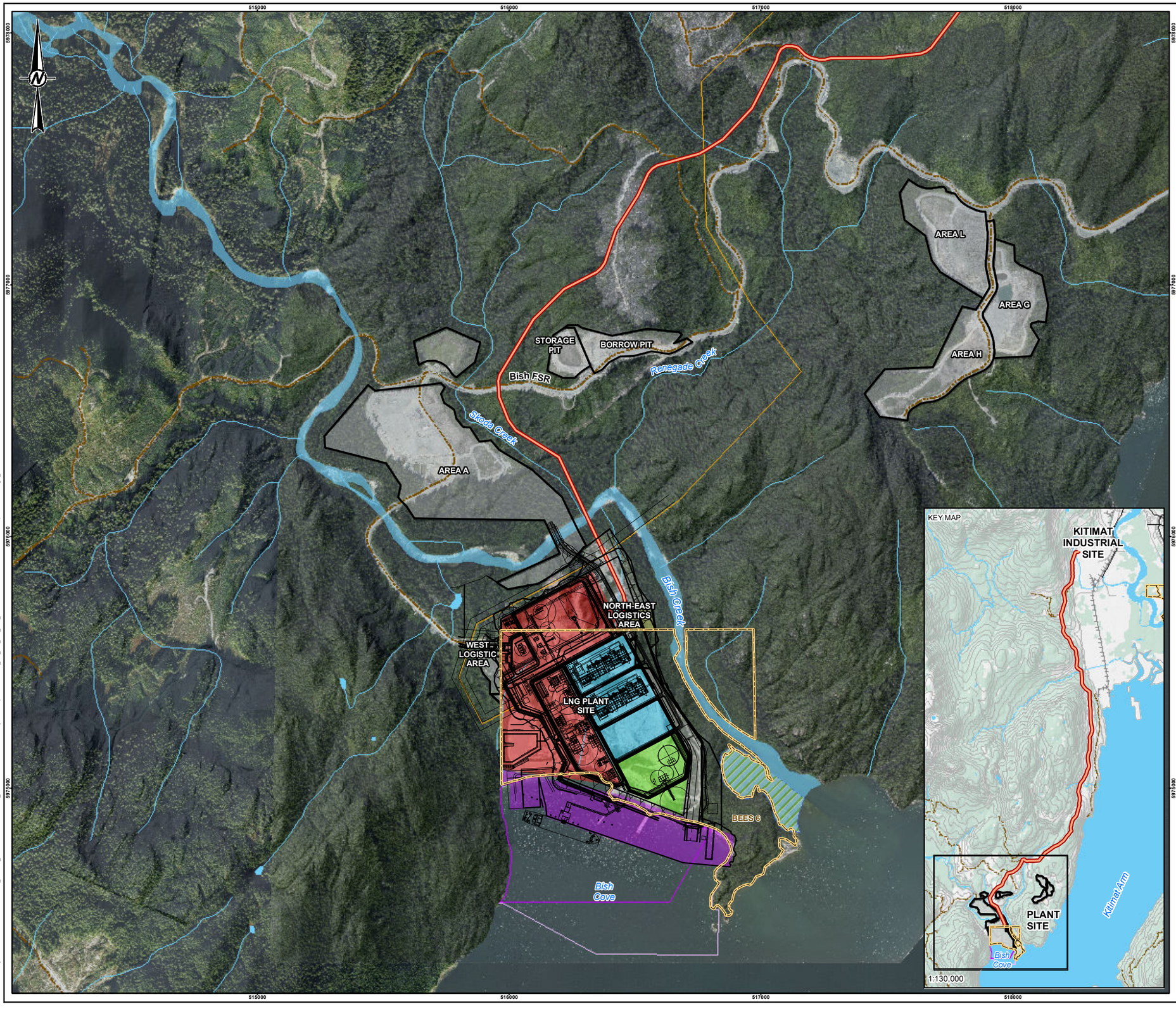

LEGEND

PROJECT DATA

- FACILITY LAYOUT
- PROPOSED PIPELINE CORRIDOR
- EXISTING PROJECT FOOTPRINT
- PROPOSED NEW DEVELOPMENT AREA
- EXISTING FORESHORE LEASE AREA
- PROPOSED FORESHORE LEASE AREA

PLANT SITE AREAS

- INSIDE BATTERY LIMITS (ISBL)
- OUTSIDE BATTERY LIMITS (OSBL)
- LNG STORAGE AREA
- LAND BACKED WHARF (LBW)

BASE DATA

- LOCAL ROAD
- TRANSMISSION LINE
- FOREST SERVICE ROAD
- WATERCOURSE
- CONTOUR (20m)
- WATERBODY
- WETLAND
- FIRST NATION RESERVE
- VEGETATION

0 250 500

1:15,000 METRES

REFERENCES

1. EXISTING AND PROPOSED STUDY AREA DIGITIZED FROM MAPPING PROVIDED BY CHEVRON.
2. FOREST SERVICE ROADS, HYDROLOGY, PARKS AND PROTECTED AREAS CONTAINS INFORMATION LICENSED UNDER THE OPEN GOVERNMENT LICENSE – BRITISH COLUMBIA.
3. FIRST NATION RESERVES OBTAINED FROM IHS ENERGY.
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NAD 1983 CSRS UTM ZONE 9N

CLIENT
CHEVRON CANADA LIMITED

PROJECT
KITIMAT LNG EXPANSION PROJECT

TITLE
DETAILED KLNG PLANT SITE PLAN: 12 MTPA COMPACT E-DRIVE DESIGN

Kitimat LNG

Chevron | woodside

YYYY-MM-DD	2019-07-06
DESIGNED	DK
PREPARED	RC
REVIEWED	AC
APPROVED	DK

PROJECT NO.	CONTROL	REV.	FIGURE
19117670	4300	0	3-2

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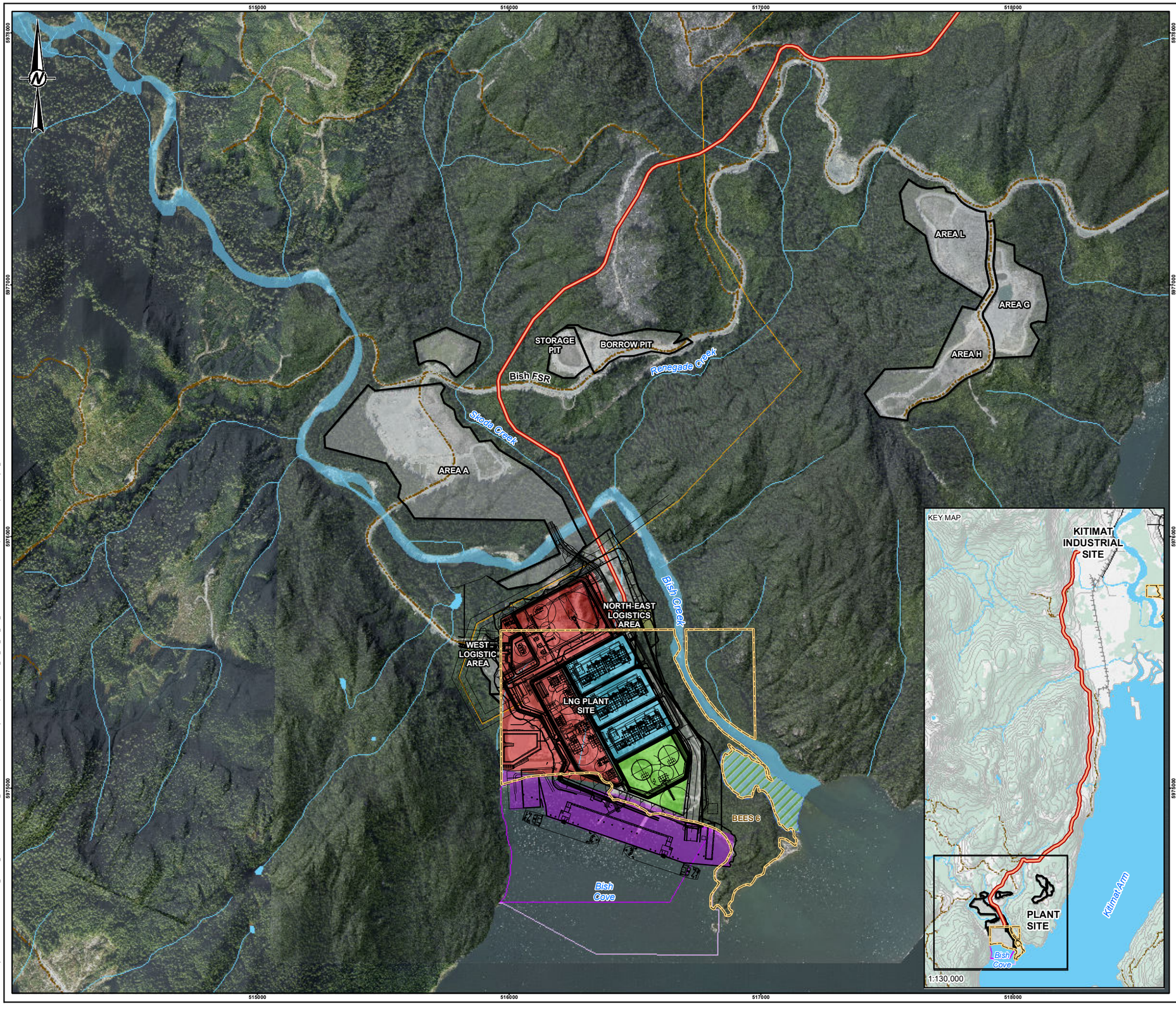

LEGEND

PROJECT DATA

- FACILITY LAYOUT
- PROPOSED PIPELINE CORRIDOR
- EXISTING PROJECT FOOTPRINT
- PROPOSED NEW DEVELOPMENT AREA
- EXISTING FORESHORE LEASE AREA
- PROPOSED FORESHORE LEASE AREA

PLANT SITE AREAS

- INSIDE BATTERY LIMITS (ISBL)
- OUTSIDE BATTERY LIMITS (OSBL)
- LNG STORAGE AREA
- LAND BACKED WHARF (LBW)

BASE DATA

- LOCAL ROAD
- TRANSMISSION LINE
- FOREST SERVICE ROAD
- WATERCOURSE
- CONTOUR (20m)
- WATERBODY
- WETLAND
- FIRST NATION RESERVE
- VEGETATION

0 250 500

1:15,000 METRES

REFERENCES

1. EXISTING AND PROPOSED STUDY AREA DIGITIZED FROM MAPPING PROVIDED BY CHEVRON.
2. FOREST SERVICE ROADS, HYDROLOGY, PARKS AND PROTECTED AREAS CONTAINS INFORMATION LICENSED UNDER THE OPEN GOVERNMENT LICENSE – BRITISH COLUMBIA.
3. FIRST NATION RESERVES OBTAINED FROM IHS ENERGY.
4. ROADS OBTAINED FROM GEOGRATIS, © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED.
5. IMAGERY PROVIDED BY CHEVRON.

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CLIENT

CHEVRON CANADA LIMITED

PROJECT

KITIMAT LNG EXPANSION PROJECT

TITLE

DETAILED KLNG PLANT SITE PLAN: PROPOSED 18 MTPA EXPANSION PROJECT

Kitimat LNG

YYYY-MM-DD	2019-07-06
DESIGNED	DK
PREPARED	RC
REVIEWED	AC
APPROVED	DK

PROJECT NO.	CONTROL	REV.	FIGURE
19117670	4300	0	3-3

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

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4 Federal Involvement

4.1 Federal Lands

Part of the Bish Cove site is on Bees IR No. 6. The Haisla Nation approved the lease of Bees IR No. 6 to KM LNG in November 2010, and the lease was subsequently issued by INAC. No federal funding is being provided to the KLNG Expansion Project. The Proponent does not anticipate the KLNG Expansion Project will cause any changes to the environment outside of British Columbia or outside of Canada (*i.e.*, no transboundary effects anticipated).

4.2 Federal Permits and Approvals

Federal permits and approvals required for the KLNG Expansion Project, are presented in Table 4-1.

Table 4-1 Federal Permits and Approvals Potentially Applicable to the Kitimat KLNG Expansion Project

Permit/Approval	Federal Agency	Federal Statute	Project Activity
Export Licence	National Energy Board	*National Energy Board Act*	To export LNG outside of Canada to international markets; export licences are typically approved for 20-40-year terms, which terms begin upon commencement of exports. Existing 20-year Export Licence for 10 MTPA facility obtained Nov 14, 2011. Export Licence application for 18 MTPA facility for 40 years was submitted April 1, 2019.
Fisheries Act Authorization	Fisheries and Oceans Canada	*Fisheries Act*	Existing Authorization for impacts to fish habitats associated with all aspects of the approved KLNG Project (marine, facility, access road and interconnecting infrastructure) issued December 1, 2011. New Fisheries Act Authorization and habitat offsetting required for the removal of additional fish habitat and the construction of the LBW for the Compact E-drive Design. Temporary and permanent docks. Temporary and permanent onshore infrastructure in and around streams.
Navigation Protection Act Approval	Transport Canada	*Navigation Protection Act*	LNG marine terminal facilities. Offloading docks. Existing approvals for construction related infrastructure, including the access road bridge over Bish Creek, barge landing facilities, and a site access jetty issued between July 2011 and January 2012.

Permit/Approval	Federal Agency	Federal Statute	Project Activity
Certificates of Compliance	Transport Canada	*Marine Transportation Security Act* and Regulations	Operation of the LNG facility, port, and carriers.
Disposal at Sea Permit	Environment Canada	*Canadian Environmental Protection Act* and Disposal at Sea Regulation	Marine disposal of dredged material for the Compact E-drive Design as well as materials excavated from the KLNG Project site to reach required grade.
Explosive Licences and Permits	Natural Resources Canada	*Explosives Act* and Regulations	Explosive Licence required for factories and magazines. Explosive Permit required for vehicles used for the transportation of explosives.

4.2.1.1 TERMPOL

The Technical Review Process of Marine Terminal Systems and Transhipment Sites (TERMPOL) includes the transportation of LNG. The voluntary TERMPOL process is conducted by Transport Canada and supports its review and approval of projects and the issuance of permits, such as those required under the *Navigation Protection Act*. The purpose of a TERMPOL review is to identify the navigational risks posed by shipping certain commodities and by the shipping activity itself. By identifying the areas of potential risk, project changes or shipping requirements can be identified to reduce or eliminate the risks of collisions, groundings, etc. by that potential risk. Undertaking such a risk assessment of the shipping and port operations is part of due diligence.

In 2012, the Proponent initiated a TERMPOL review for the KLNG Project in accordance with the conditions of EAC E06-01. The TERMPOL review process considered shipping safety for a single berth facility designed to handle approximately 150 LNG carriers per year ranging in size from of 125,000 to 217,000 m^3. This volume of traffic is broadly aligned with the foundation (two [2] LNG Train) project. The KLNG Project TERMPOL report contained a critical assessment of marine safety and environmental considerations to demonstrate that:

- the KLNG Project complies with or exceeds regulatory marine safety measures in the context of transport of hazardous materials; and
- The proponent can prevent, manage and mitigate unintentional loss of LNG containment and the associated risks with loading, navigation and natural hazards.

Transport Canada issued the TERMPOL Review Process on the Kitimat LNG Project report in October 2018, outlining its recommendations and findings that describe authorities' actions to enhance the overall safety of the KLNG Project following review of the technical surveys and studies submitted and consultation with the First Nations. TERMPOL Review Committee (TRC) recommendations, included:

- The LNG carriers used for the KLNG Project should limit their speed to a maximum of 12kn when accompanied by tug escort.

- The proponent should ensure all carriers that call at the terminal possess a Ship Inspection Report Programme (SIRE) certificate that is no more than six months old, as part of their Carrier Acceptance Program.
- The proponent should ensure that venting of boil-off gases does not occur when pilots are boarding project carriers or during pilot transfer by helicopter.
- The proponent should ensure that all tug operators used for the project have undergone T2 training.
- The proponent should pursue full tug escort for both inbound and outbound vessels between the project terminal in the Douglas Channel and Browning Entrance, north of the Principe Channel.
- The proponent should continue its efforts to obtain information on concentrations of marine mammal populations, including Minke whales, to develop speed profiles and other mitigation measures for underwater vessel noise. This includes participation in regional initiatives, such as future Smart Oceans workshops, to obtain the best data available concerning marine mammals along the project route.

The KLNG Project TERMPOL report will be updated to reflect the additional vessel traffic associated with the proposed KLNG Expansion Project.

5 Environmental Effects

5.1 Environmental Setting

The following sections provide an overview of the environmental setting of the KLNG Expansion Project. Figure 5-1 provides and overview of the watercourses, wetlands, nearby communities, marine protected areas, power transmission lines and roads. Figure 5-2 shows the known archaeological sites in proximity to the Plant Site.

5.1.1 Climate and Atmosphere

Located in the Pacific climate region, the KLNG Project area has relatively mild winters and moderately cool summers, with small seasonal temperature differences. January is the coldest month, with average temperatures below freezing, and July and August are the warmest months, with average daily temperatures slightly more than 15°C. Average daily rainfall in Kitimat is highest in the autumn months, particularly in October and November. The summer month of July is the driest. Snow can fall any time between October and April, but is most common between December and the end of February.

5.1.2 Terrestrial

5.1.2.1 Topography and Surficial Geology

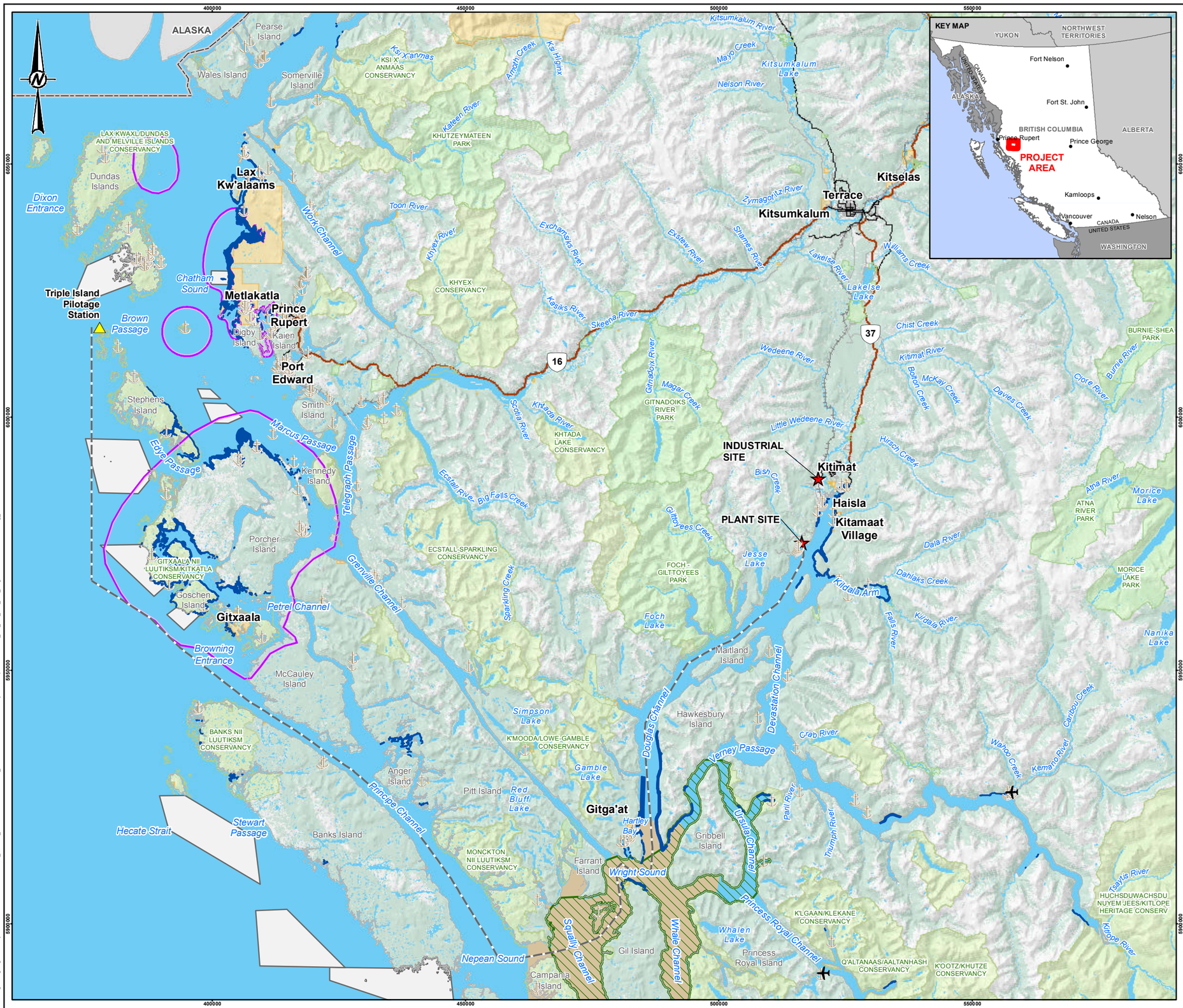
The site is located within the Coast Mountains physiographic region. The regional topography is mountainous with terrain typical of intrusive igneous rocks shaped by alpine glaciation processes. On most slopes in the region there are extensive igneous bedrock outcrops and accumulations of colluvial material. The slopes are generally steep and the topography is rugged. Basins, plains, and lowlands in the region consist largely of fluvial glacial materials deposited by meltwater or fluvial river terraces.

Marine materials consist of marine clay deposits overlain by outwashes of sand and gravel. Alluvial sands and gravels of recent origin are found along the river/creek channels. Minor deposits of organic materials consisting of peat are evident in depressional areas.

5.1.2.2 Vegetation

The plant site is situated at Bish Cove in the Bish Creek watershed and is in the Coastal Western Hemlock (CWH) Biogeoclimatic Ecosystem Classification (BEC) zone, very wet maritime, submontane variant (CWHvm1). This variant is characterised by submaritime, humid and very snowy climate, with forests generally dominated by western redcedar (*Thuja plicata*) and amabilis fir (*Abies amabilis*), although western hemlock (*Tsuga heterophylla*), Sitka spruce (*Picea sitchensis*) are sometimes abundant (Banner et al. 1993).

The plant site has been previously cleared of vegetation for construction of the facility; however, vegetation surrounding the site includes areas of old growth forest, riparian ecosystems associated with Bish Creek, Renegade Creek, and other unnamed streams.



LEGEND

- AIRPORT
- EXISTING MARINE / MOORAGE / ANCHORAGE LOCATION
- HUMPBACK WHALE - CRITICAL HABITAT
- IMPORTANT BIRD AREA
- HERRING SPAWN
- ROCK FISH CONSERVATION
- KILLER WHALE - POTENTIAL CRITICAL HABITAT FOR NORTHERN RESIDENTS

PROJECT DATA

- KITIMAT LNG (PLANT AND INDUSTRIAL
- PROPOSED SHIPPING ROUTE

BASE DATA

- PILOTAGE STATION
- HIGHWAY
- MAJOR ROAD
- LOCAL ROAD
- RAILWAY
- INTERNATIONAL BOUNDARY
- WATERCOURSE
- WATERBODY
- FIRST NATION RESERVE
- CONSERVANCY AREA
- PARKS AND PROTECTED AREAS
- VEGETATION

0 15 30

1:750,000 KILOMETRES

REFERENCE(S)

1. FOREST SERVICE ROADS, HYDROLOGY, PARKS AND PROTECTED AREAS CONTAINS INFORMATION LICENSED UNDER THE OPEN GOVERNMENT LICENSE – BRITISH COLUMBIA.
2. INDIAN RESERVES AND RAILWAYS OBTAINED FROM IHS ENERGY.
3. CONTOURS, ROADS, INTERNATIONAL BOUNDARY, VEGETATION, AND SHADED RELIEF OBTAINED FROM GEOGRATIS, © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED.

COORDINATE SYSTEM: NAD 1983 CSRS UTM ZONE 9N

CLIENT
CHEVRON CANADA LIMITED

PROJECT
KITIMAT LNG EXPANSION PROJECT

TITLE
ENVIRONMENTAL SETTING

Kitimat LNG

YYYY-MM-DD	2019-07-07
DESIGNED	DK
PREPARED	RC
REVIEWED	AC
APPROVED	DK

PROJECT NO.	CONTROL	REV.	FIGURE
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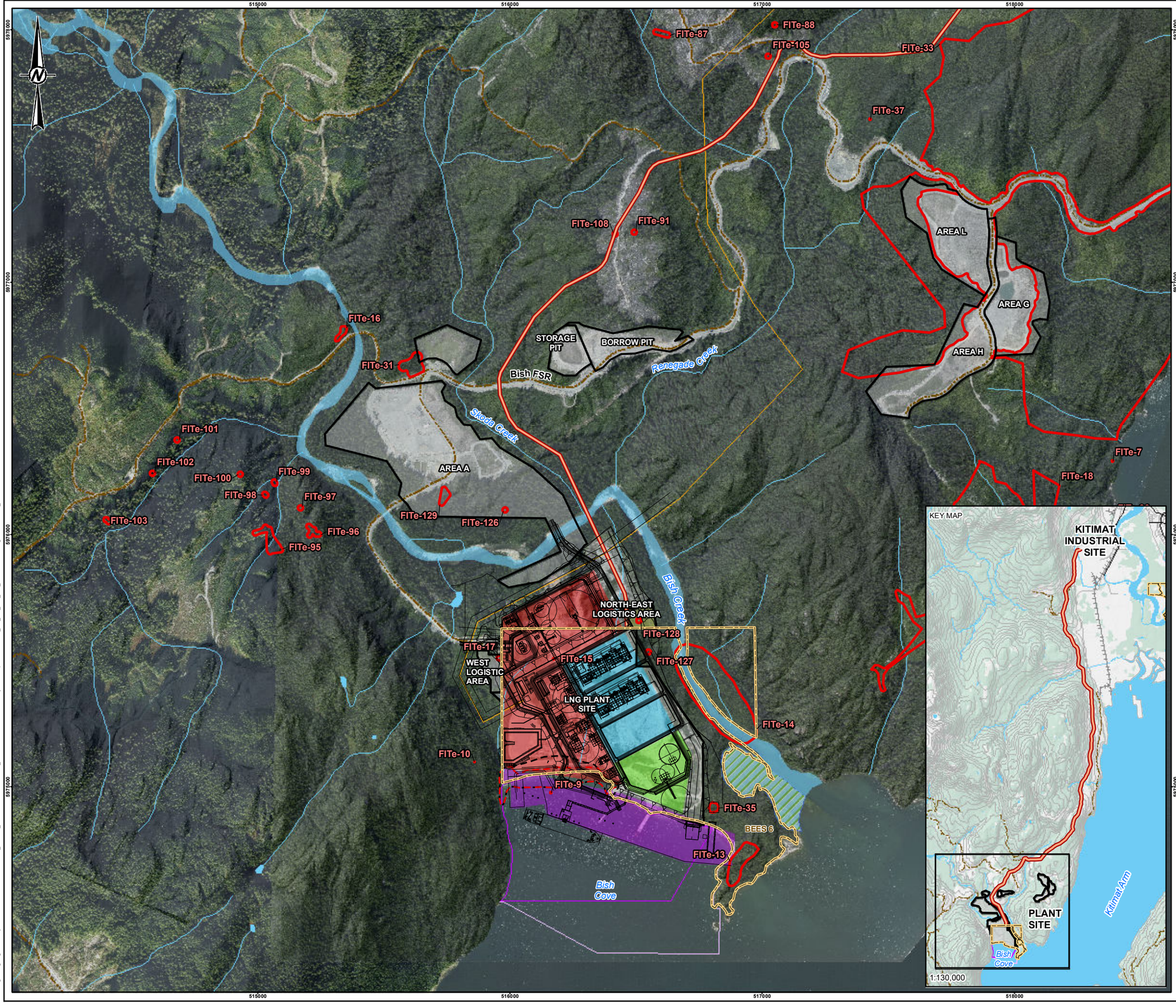

LEGEND

- REVISED ARCHAEOLOGICAL SITE BOUNDARY (2019)
- ARCHAEOLOGICAL SITE BOUNDARY AS ORIGINALLY PROPOSED (MILLENNIA 1997)
- PREVIOUSLY RECORDED ARCHAEOLOGICAL SITE

PROJECT DATA

- FACILITY LAYOUT
- PROPOSED PIPELINE CORRIDOR
- EXISTING PROJECT FOOTPRINT
- PROPOSED NEW DEVELOPMENT AREA
- EXISTING FORESHORE LEASE AREA
- PROPOSED FORESHORE LEASE AREA

PLANT SITE AREAS

- INSIDE BATTERY LIMITS (ISBL)
- OUTSIDE BATTERY LIMITS (OSBL)
- LNG STORAGE AREA
- LAND BACKED WHARF (LBW)

BASE DATA

- LOCAL ROAD
- TRANSMISSION LINE
- FOREST SERVICE ROAD
- WATERCOURSE
- CONTOUR (20m)
- WATERBODY
- WETLAND
- FIRST NATION RESERVE
- VEGETATION

0 250 500

1:15,000 METRES

REFERENCES

1. ARCHAEOLOGICAL SITES OBTAINED FROM B.C. MINISTRY OF FORESTS, LANDS AND NATURAL RESOURCE OPERATIONS ON 20190103.
2. EXISTING AND PROPOSED STUDY AREA DIGITIZED FROM MAPPING PROVIDED BY CHEVRON.
3. FOREST SERVICE ROADS, HYDROLOGY, PARKS AND PROTECTED AREAS CONTAINS INFORMATION LICENSED UNDER THE OPEN GOVERNMENT LICENSE – BRITISH COLUMBIA.
4. FIRST NATION RESERVES OBTAINED FROM IHS ENERGY.
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CLIENT
CHEVRON CANADA LIMITED

PROJECT
KITIMAT LNG EXPANSION PROJECT

TITLE
ENVIRONMENTAL SETTING - KNOWNARCHAEOLOGICAL SITES

Kitimat LNG

YYYY-MM-DD	2019-07-07
DESIGNED	DK
PREPARED	RC
REVIEWED	AC
APPROVED	DC

PROJECT NO.	CONTROL	REV.	FIGURE
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5.1.2.3 Wildlife

Wildlife and wildlife habitat at the site is influenced by the vegetation and climate, which is defined as CWHvm1 in the provincial BEC zone classification.

The focus on wildlife will be on species of conservation concern, which are defined as those that are either federally listed as "Special Concern," "Threatened" or "Endangered" on Schedule 1 of Species At Risk Act, or are provincially "Blue-" or "Red-listed". Terrestrial wildlife candidate focal species will be selected based on conservation status, regulatory frameworks for legally binding requirements, importance to Aboriginal Groups for traditional purposes, and other stakeholder interest such as hunting or public interest. Further, candidate focal species will be selected to represent a variety of taxa (i.e., species groups), environmental conditions (e.g., habitats) and ecological roles (e.g., predators and prey) applicable to evaluating Project effects as part of the Environmental Assessment Certificate (EAC) amendment.

5.1.3 Freshwater Fish and Fish Habitat

The Project Area landscape contains both fish and non-fish bearing watercourses. Bish Creek is the main stream flowing into Kitimat Arm and is an important spawning destination for Pacific salmon species such as pink (*Oncorhynchus gorbuscha)*, sockeye *(O. nerka)*, chum *(O. keta)*, coho *(O. kisutch*, chinook *(O. tshawytscha)*) and cutthroat trout (*O. clarkii*). Juvenile salmon of each of these four species has been found in Bish Creek and Bish Cove with Chum and pink salmon being the most abundant.

5.1.4 Marine Resources

The plant site is located at Bish Cove which is within the Kitimat Arm of Douglas Channel. The Kitimat Arm/Douglas Channel area is part of the North Coast Fjord ecosystem. The oceanographic aspects are largely governed by the physical characteristics of Douglas Channel, which is driven primarily by a combination of hydraulic gradient, wind stress, and tides.

5.1.4.1 Marine Fish

Marine fish present within Kitimat Arm and Bish Cove include regionally important populations of all five Pacific salmon species pink, sockeye, chum, coho, and chinook. Other marine fish species include Dolly Varden (*Salvelinus malma)* Steelhead trout (*O. mykiss*), starry flounder *(Platichthys stellatus)* cutthroat trout, Eulachon (*Thaleichthys pacificus*), Pacific herring (*Clupea harengus pallasi*), Rockfish (*Sebastes spp.*), Pacific halibut (*Hippoglossus stenolepsis*), threespine stickleback (*Gasterosteus aculeatus*), and shiner perch *(Cymatogaster aggregate)*.

Shellfish know to occur in the area include mussels (*Mytilus spp.*) and Dungeness crab (*Cancer magister*). Dolly Varden and cutthroat trout are special conservation concern and are Blue-listed in BC. Eulachon are currently listed as endangered by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and are provincially Blue-listed.

5.1.4.2 Marine Plants and Habitat

Marine vegetation in Bish Cove includes a patchy distribution of eelgrass (*Zostera marina*) beds on the lower intertidal and shallow subtidal zones, patches of salt marsh vegetation communities represented by Lyngbye's sedge (*Carex lyngbyei*), *Calamagrostis canadensis*, and saltgrass *Distichlis* spicata in the

upper intertidal zone, and intertidal vegetation is represented by rockweed (*Fucus spp*) and stringy sea lettuce (*Ulva spp.*).

5.1.4.3 Marine Mammals

Marine mammals that occur in Douglas Channel include killer whales **(***Orcinus orca*), humpback whales **(***Megaptera novaeangliae)*, Steller sea lion **(***Eumetopias jubatus)*, Dall's porpoise **(***Phocoenoides dalli*), harbour porpoise (*Phocoena phocoena)* and harbour seal (*Phoca vituline)*.

The federal *Species at Risk Act* (SARA) lists the northern resident killer whales as threatened and harbour porpoises and Steller sea lions as Special Concern.

5.1.4.4 Marine Birds (including Migratory Birds)

Marine birds (including migratory birds) are a diverse group of avian species that may use marine areas in Douglas Channel and along the shipping route to Triple Islands at some time of the year and refers collectively to the following taxonomic groups: waterfowl (ducks, geese, and swans), loons, grebes, tubenoses (shearwaters, petrels, and storm-petrels), cormorants, herons, shorebirds (oystercatchers, plovers, and sandpipers), alcids (auks, murres, and puffins), and larids (gulls and terns), as well as bald eagle *(Haliaeetus leucocephalus)*, osprey *(Pandion haliaetus)*, peregrine falcon *(Falco peregrinus)*.

Focal bird species include Cassin's auklet (*Ptychoramphus aleuticus)*, great blue heron*,* western grebe *(Aechmophorus occidentalis),* marbled murrelet, ancient murrelet *(Synthliboramphus antiquus)* and surf scoter *(Melanitta perspicillata).*

5.2 Preliminary Effects Assessment

Federal and provincial EA authorities concluded in 2006 that the KLNG Project was not likely to result in significant adverse effects to identified Valued Components (VCs).

The assessment of proposed changes to the certified project in 2008 to include liquefaction (EAC E06-01 Amendment #1) predicted no significant adverse effects; for many VCs, reduced or beneficial impacts were predicted.

A preliminary effects assessment for the Kitimat LNG Expansion Project is provided below in Tables 5-1 through 5-14 (Preliminary Effects Assessment). The Preliminary Effects Assessment focuses on the expansion of the existing facility, potential incremental changes and associated adverse effects. Interactions associated with the approved concept that are not affected by the KLNG Expansion Project were not re-evaluated. **The proposed changes to the approved KLNG Project design and operations are not expected to result in significant adverse residual effects.**

Table 5-1 Preliminary Effects Assessment of KLNG Expansion Project on the Atmospheric Environment

Candidate VCs	Sub Components	Project Activities (of the KLNG Project, inclusive of KLNG Expansion Project)	Potential Incremental Effects *	Mitigation	Effects Assessment
Greenhouse Gas Management	-	Construction: emissions from fuel combustion, power generation, vehicle traffic, shipping, flaring (for commissioning purposes only). Operations: emissions from fuel combustion, limited power generation, vehicle traffic, shipping, flaring (for emergency purposes only). Decommissioning: emissions from fuel combustion, vehicle and supply vessel traffic, shipping, flaring (for emergency purposes only).	Increase in GHG emissions with potential impacts to local and global climate change (primarily during operational phase). Primary substances of concern are methane and CO2.	The LNG plant will use electric motor driven technology for all liquefaction process and utility compressors, pumps and fans. As a result, the KLNG Project will be one of the lowest GHG emitters of its type. An electric drive concept also means that significant increases to liquefaction capacity can be achieved with a negligible increase in GHG emissions. See Atmospheric Environment (Climate) related commitments of EA Certificate E06-01 (Appendix B).	2006 review concluded that the KLNG Project was not likely to result in significant adverse effects. 2008 review concluded that residual effects will be less than significant. The proposed changes to the approved project design and operations are not predicted to result in significant adverse residual effects.
Air Quality	-	Construction: emissions from land clearing, blasting, grading and earthworks, hauling, material handling, fuel combustion, power generation, vehicle traffic, shipping, flaring (for commissioning purposes only). Operations: emissions from material handling, fuel combustion, limited power generation, vehicle traffic, combustion of acid gas removal unit gases and ancillary operations, shipping, flaring (for emergency purposes only). Decommissioning: emissions from material handling, backfilling, contouring, fuel combustion, vehicle and supply vessel traffic, shipping, flaring (for emergency purposes only).	Change in air quality in the Kitimat airshed due to increased emissions of criteria air contaminants, resulting in potential impacts on human health and wildlife. Primary substances of concern include nitrogen dioxide (NO2), sulphur dioxide (SO2), carbon monoxide (CO), particulate matter (PM2.5 and PM10) and volatile organic compounds.	The LNG plant will use electric motor driven technology for all liquefaction process and utility compressors, pumps and fans. Use of electric drives largely eliminates combustion related emissions such as NO2 and SO2. See Atmospheric Environment (Air Quality) related commitments of EA Certificate E06-01 (Appendix B).	2006 review concluded that the KLNG Project was not likely to result in significant adverse effects. 2008 review concluded that residual effects will be less than significant. The proposed changes to the approved project design and operations are not predicted to result in significant adverse residual effects.

Candidate VCs	Sub Components	Project Activities (of the KLNG Project, inclusive of KLNG Expansion Project)	Potential Incremental Effects *	Mitigation	Effects Assessment
-	In-Air Noise	Construction: noise emissions from site clearing, subsurface rock removal and blasting for grading, compaction, pile-driving, construction of buildings and other structures, facility assembly, general equipment movement, bolt tightening, pneumatic testing, line cleaning and pressure testing of pipework and pressure vessels on site flaring (for commissioning purposes only); underwater blasting and/or dredging of marine sediment; installing infrastructure related to the facility and the terminal Operations: noise emissions from process facility equipment, vehicle traffic and loading of LNG carriers; cooling fans; low frequency noise emissions from exhausts and vessel engine noise, navigational sound signals during marine vessel operations, flaring (for emergency purposes only) Decommissioning: noise emissions from combustion of fuels and equipment and traffic due to demolition activities, flaring (for emergency purposes)	Increase in aboveground noise, resulting in disturbance to human populations and displacement and disturbance of wildlife.	See Atmospheric Environment (In-Air Noise) related commitments of EA Certificate E06-01 (Appendix B).	Not previously assessed. In assessing the proposed changes to the approved project design and operations, In-Air Noise is proposed as a Pathway Component to other VCs (e.g., Wildlife and Wildlife Habitat).

* The preliminary effects assessment focuses on the expansion of the federally and provincially approved KLNG Project concepts, potential incremental changes and associated adverse effects. Interactions associated with the federally and provincially approved KLNG Project concepts that are not affected by the proposed KLNG Expansion Project were not re-evaluated.

Table 5-2 Preliminary Effects Assessment of KLNG Expansion Project on the Terrestrial Environment

Candidate VCs	Sub Components	Project Activities (of the KLNG Project, inclusive of KLNG Expansion Project)	Potential Incremental Effects *	Mitigation	Effects Assessment
-	Geology/ Terrain and Soils	Construction: clearing; blasting; grading and earthworks; potential dredging; excavation activities including removing soil and overburden, stockpiling; temporary resurfacing; installation of culverts; heavy vehicle traffic; road and infrastructure development, fuel and chemical handling and storage; potential usage and withdrawal of freshwater. Operations: road and infrastructure use and maintenance; fuel and chemical handling and storage. Decommissioning: vehicle traffic; road and infrastructure removal; fuel and chemical handling and storage; demolition activities that may include clearing, blasting, grading and earthworks.	Alteration of the surrounding landscape Acid rock drainage or metal leaching potential within excavated rock materials and exposed rock cuts, resulting in groundwater and surface water quality impacts Impacts to coastline stability and erosion potential due to changes in tidal currents and waves Alteration, admixing, compaction and potential erosion of soil materials due to site clearing and the removal of vegetation cover and root mats. May create erosion on the Project site and create sedimentation impacts off site, resulting in water quality impacts. Contamination of soil materials by fuel or chemical spills during construction activities. Compaction or rutting of soils, particularly under wet conditions, due to heavy traffic.	Restoration of the Project site through use of stockpiled soil materials and their distribution across the site. See Terrestrial Environment related commitments of EA Certificate E06-01 (Appendix B).	2006 review concluded that the KLNG Project was not likely to result in significant adverse effects. 2008 review concluded there would be no change in significance of potential adverse effects. In assessing the proposed changes to the approved project design and operations, Geology/Terrain and Soils are proposed as Pathway Components to other VCs (e.g., Vegetation, Surface Water Resources)

Candidate VCs	Sub Components	Project Activities (of the KLNG Project, inclusive of KLNG Expansion Project)	Potential Incremental Effects *	Mitigation	Effects Assessment
Vegetation & Wetlands	Rare Plants Rare Plant Communities	Construction: vegetation removal and land clearing and excavation; stockpiling; temporary resurfacing; heavy vehicle traffic; road and infrastructure development; temporary workspace installation; fuel and chemical handling and storage; dewatering. Operations: road and infrastructure use and maintenance; fuel and chemical use.	Clearing and vegetation removal during construction could potentially result in direct loss or change in ecological function of: wetlands, old growth forest, federally or provincially listed plant species, traditional use plant species, and/or provincially listed ecological communities. Indirect effects to terrestrial vegetation and ecosystems, change in wetland ecosystem function could result from changes in drainage patterns, dust deposition, airborne deposition of chemical compounds, proliferation of noxious/invasive species, etc. Effects may occur from habitat loss or alteration resulting in change in habitat suitability; changes in mortality risk due to risks of collisions with infrastructure; alteration of movement patterns including displacement; disturbance due to lighting and noise.	See Terrestrial Environment related commitments of EA Certificate E06-01 (Appendix B).	2006 review concluded that the KLNG Project was not likely to result in significant adverse effects. 2008 review concluded there would be no change in significance of potential adverse effects. The proposed changes to the approved project design and operations are not predicted to result in significant adverse residual effects.

* The preliminary effects assessment focuses on the expansion of the federally and provincially approved KLNG Project concepts, potential incremental changes and associated adverse effects. Interactions associated with the federally and provincially approved KLNG Project concepts that are not affected by the proposed KLNG Expansion Project were not re-evaluated.

Table 5-3 Preliminary Effects Assessment of KLNG Expansion Project on Wildlife & Wildlife Habitat

Candidate VCs	Sub Components	Project Activities (of the KLNG Project, inclusive of KLNG Expansion Project)	Potential Incremental Effects *	Mitigation	Effects Assessment
Wildlife and Wildlife Habitat	Grizzly bear Black bear Mountain goat Moose Black-tailed deer Marten Coastal tailed frog	Construction: clearing of habitat; excavation; stockpiling; temporary resurfacing; installation of culverts; heavy vehicle traffic; road and infrastructure development; fuel and chemical handling and storage; noise and light from construction activities. Operations: vehicle and vessel traffic; road and infrastructure use and associated noise; fuel and chemical handling and storage. Decommissioning: vehicle traffic; road and infrastructure removal; fuel and chemical handling and storage; demolition activities.	Effects may occur from: habitat loss or alteration resulting in change in habitat suitability; changes in mortality risk due to risks of collisions with infrastructure; alteration of movement patterns including displacement; disturbance due to lighting and noise.	See Wildlife and Wildlife Habitat related commitments of EA Certificate E06-01 (Appendix B).	2006 review concluded that the KLNG Project was not likely to result in significant adverse effects. 2008 review concluded there would be no change in significance of potential adverse effects. The proposed changes to the approved project design and operations are not predicted to result in significant adverse residual effects.

* The preliminary effects assessment focuses on the expansion of the federally and provincially approved KLNG Project concepts, potential incremental changes and associated adverse effects. Interactions associated with the federally and provincially approved KLNG Project concepts that are not affected by the proposed KLNG Expansion Project were not re-evaluated.

Table 5-4 Preliminary Effects Assessment of KLNG Expansion Project on Water Resources

Candidate VCs	Sub Components	Project Activities (of the KLNG Project, inclusive of KLNG Expansion Project)	Potential Incremental Effects *	Mitigation	Effects Assessment
Surface Water Resources	Surface Water Quality Surface Water Quantity	Construction: excavation; stockpiling; temporary resurfacing; installation of culverts; construction of access roads and onshore infrastructure; heavy vehicle traffic; fuel and chemical handling and storage; construction of a storm water collection system and underground utilities. Operations: vehicle traffic; road and infrastructure use and updates; fuel and chemical handling and storage; operation of a sewage treatment plant and storm water management system.	Alteration of drainage patterns and increase of impervious areas, which can lead to erosion, waterlogging, flooding and/or the sedimentation of local watercourses and estuaries, potentially resulting in reduced water quality in streams and ocean and cause impacts to wildlife and human health and/or recreational activities. Reduced water quality in streams and ocean due to accidental fuel or chemicals spills, resulting in impacts to wildlife and human health and/or recreational activities. Potential acidification of surrounding freshwater bodies due to SO2 and NOx emissions, resulting in reduced water quality in streams and lakes and impacts to wildlife and human health and / or recreational activities. Potential eutrophication of surrounding freshwater bodies due to NOx emissions resulting in reduced water quality in streams and lakes and impacts to vegetation, wetlands, wildlife, human health, and recreational activities.	Storm water management plan required to manage water on site. See Freshwater and Fisheries Environment (Water and Wastewater Management) related commitments of EA Certificate E06-01 (Appendix B). The LNG plant will use electric motor driven technology for all liquefaction process and utility compressors, pumps and fans. Use of electric drives largely eliminates combustion related emissions such as NO2 and SO2.	2006 review concluded that the KLNG Project was not likely to result in significant adverse effects. 2008 review concluded there would be no change in significance of potential adverse effects. The proposed changes to the approved project design and operations are not predicted to result in significant adverse residual effects.

Candidate VCs	Sub Components	Project Activities (of the KLNG Project, inclusive of KLNG Expansion Project)	Potential Incremental Effects *	Mitigation	Effects Assessment
Groundwater Resources		Construction: groundwater extraction for processing and domestic use, excavation; stockpiling; temporary resurfacing; installation of culverts; construction of access roads and onshore infrastructure; heavy vehicle traffic; fuel and chemical handling and storage, potential usage and withdrawal of freshwater, construction of a storm water collection system and underground utilities. Operations: groundwater extraction for processing and domestic use; vehicle traffic, road and infrastructure use and updates; fuel and chemical handling and storage.	Alteration of groundwater recharge and discharge locally due to an increase in impervious areas and construction of a storm water collection system Changes to groundwater levels and flows, resulting in impacts to local groundwater dependent ecosystems, such as Bish Creek Impacts to groundwater quality and receiving streams, lakes, or reservoirs due to soil acidification or accidental chemical, fuel or sewage releases	Monitoring and Follow-up Program to verify predictions and adaptively management potential impacts to groundwater. The LNG plant will use electric motor driven technology for all liquefaction process and utility compressors, pumps and fans. Use of electric drives largely eliminates combustion related emissions such as NO2 and SO2.	Not previously assessed. Assessment ongoing to confirm project requirements and determine potential effects of groundwater extraction near Bish Creek. The proposed changes to the approved project design and operations are not predicted to result in significant adverse residual effects to groundwater quality due to air emissions.

* The preliminary effects assessment focuses on the expansion of the federally and provincially approved KLNG Project concepts, potential incremental changes and associated adverse effects. Interactions associated with the federally and provincially approved KLNG Project concepts that are not affected by the proposed KLNG Expansion Project were not re-evaluated.

Table 5-5 Preliminary Effects Assessment of KLNG Expansion Project on Freshwater Fish & Fish Habitat

Candidate VCs	Sub Components	Project Activities (of the KLNG Project, inclusive of KLNG Expansion Project)	Potential Incremental Effects *	Mitigation	Effects Assessment
Freshwater Fish & Fish Habitat	Riparian Habitat Instream Fish Habitat Direct Mortality of Fish and/or Fish Ova	Construction: excavation, stockpiling, temporary resurfacing, installation of culverts and bridges, heavy vehicle traffic, road and infrastructure development, fuel and chemical handling and storage. Operations: vehicle traffic, road and infrastructure use and updates, fuel and chemical handling and storage.	Potential impacts to fish-bearing streams from installation of road crossing culverts and bridges Increased runoff and dust generation during the construction and decommissioning phases, could potentially enter fish-bearing streams via runoff and lead to environmental effects on water quality, fish and fish habitat	Install clear span bridges and follow BMPs for stream crossings. See Freshwater and Fisheries Environment related commitments of EA Certificate E06-01 (Appendix B).	2006 review concluded that the KLNG Project was not likely to result in significant adverse effects. 2008 review concluded there would be no change in significance of potential adverse effects. The proposed changes to the approved project design and operations are not predicted to result in significant adverse residual effects.

* The preliminary effects assessment focuses on the expansion of the federally and provincially approved KLNG Project concepts, potential incremental changes and associated adverse effects. Interactions associated with the federally and provincially approved KLNG Project concepts that are not affected by the proposed KLNG Expansion Project were not re-evaluated.

Table 5-6 Preliminary Effects Assessment of KLNG Expansion Project on Marine Resources

Candidate Valued Components	Sub Components	Project Activities (of the KLNG Project, inclusive of KLNG Expansion Project)	Potential Incremental Effects *	Mitigation	Effects Assessment
Marine Resources	Marine Mammals Marine Fish and Fish Habitat Marine Birds (including Migratory Birds)	Construction: underwater pile driving; dredging of marine sediment; installation of marine infrastructure related to the LBW; land-based site clearing; and storm water drainage system and sanitary sewage effluent discharge. Operations: vessel traffic, wake and prop wash, shading, and associated underwater noise and light; operation of LNG facility and supporting infrastructure and discharge of Storm water to marine environment; operation of marine terminal; and LNG shipping. Decommissioning: removal of marine infrastructure; dismantling onshore facilities and supporting infrastructure and management of storm water discharge to marine environment.	Behavioural disturbance (displacement, avoidance, or communication masking) due to underwater noise or artificial light from project activities (e.g., pile driving, blasting, dredging, shipping). Potential injury/mortality or behavioral disturbance (e.g., displacement or avoidance) due to interaction with Project during shipping activities. Potential effects associated with accidents and malfunctions, including unplanned spills to the marine environment. Changes to health, survivorship, or behavior due to indirect effects from the Project (e.g., changes in habitat quality, reduced prey availability) because of effluent discharges from Project vessels and onshore activities/infrastructure. Storm water discharge into Bish Cove may alter water quality resulting in change in fish habitat use, physiology or alter mortality risk. Loss of near shore habitat (i.e., eelgrass) will impact marine fish, including juvenile salmonids. Effects may occur from habitat loss or alteration resulting in change in habitat suitability; changes in mortality risk due to risks of collisions with infrastructure; alteration of movement patterns including displacement; disturbance due to lighting and noise.	*Fisheries Act* Authorization and habitat offsetting required for the removal of eelgrass habitat and the construction of the LBW. Monitoring required for permitted discharge of storm water.	2006 review concluded that the KLNG Project was not likely to result in significant adverse effects. 2008 review concluded there would be no change in significance of potential adverse effects or that residual effects will be less than significant. The proposed changes to the approved project design and operations are not predicted to result in significant adverse residual effects (i.e., following habitat offsetting).

* The preliminary effects assessment focuses on the expansion of the federally and provincially approved KLNG Project concepts, potential incremental changes and associated adverse effects. Interactions associated with the federally and provincially approved KLNG Project concepts that are not affected by the proposed KLNG Expansion Project were not re-evaluated.

Table 5-7 Preliminary Effects Assessment of KLNG Expansion Project on Economic Conditions

Candidate VCs	Sub Components	Project Activities (of the KLNG Project, inclusive of KLNG Expansion Project)	Potential Incremental Effects *	Mitigation	Effects Assessment
Economic Conditions		Construction: during construction peak manning is estimated to be between 1,800 and 2,500 depending on final development plan. Operations: operations phase is expected to provide direct employment for approximately 300 – 450 people. Decommissioning: activities will require contractor services.	Increased job opportunities, financial growth and training opportunities could positively influence socio-economic well-being in the local communities. Project expenditures will accrue to individuals, businesses and communities in the local area and region, contributing to the development of the local and regional economies. Risk of goods and services shortages and price inflation in the local area during the construction phase due to the Kitimat area's relatively small economy and the expected goods and services requirements of the Project. Increased demand for temporary accommodation and permanent housing from persons and their dependents who temporarily and/or permanently relocate to the local area for work. Higher demands on utility, health, emergency, transportation services, community services, and infrastructure from the temporary and/or permanent population increase, with potential implications for the capacity, resourcing and costs of these services.	See Communities and Economy related commitments of EA Certificate E06-01 (Appendix B).	2006 review concluded that the KLNG Project was not likely to result in significant adverse effects (700 person-years of employment during construction; 50 permanent jobs during operations). 2008 review concluded there would be increased beneficial employment and economic effects (1,500 person-years of employment during construction; 100 permanent jobs during operations). The proposed changes to the approved project design and operations are not expected to result in significant adverse effects. Positive effects on the economy are expected from increased local employment and capital investment in Kitimat.

* The preliminary effects assessment focuses on the expansion of the federally and provincially approved KLNG Project concepts, potential incremental changes and associated adverse effects. Interactions associated with the federally and provincially approved KLNG Project concepts that are not affected by the proposed KLNG Expansion Project were not re-evaluated.

Table 5-8 Preliminary Effects Assessment of KLNG Expansion Project on Community Health & Wellbeing

Candidate VCs	Sub Components	Project Activities (of the KLNG Project, inclusive of KLNG Expansion Project)	Potential Incremental Effects *	Mitigation	Effects Assessment
Community Health & Wellbeing		Construction: during construction, peak manning is estimated to be between 1800 and 2500 depending on final development plan. Operations: operations phase is expected to provide direct employment for approximately 300 – 450 people.	Adverse and beneficial effects on important determinants and parameters of community health and wellbeing, including disposable income, alcohol and drug abuse, crime, community connectedness, and stress, particularly during the construction phase.	See Communities and Economy related commitments of EA Certificate E06-01 (Appendix B).	2006 review concluded that the KLNG Project was not likely to result in significant adverse effects. 2008 review concluded there would be no change in significance of potential adverse effects. The proposed changes to the approved project design and operations are not predicted to result in significant adverse residual effects. Mainly beneficial effects are expected from the infrastructure upgrades associated with the KLNG Project.

* The preliminary effects assessment focuses on the expansion of the federally and provincially approved KLNG Project concepts, potential incremental changes and associated adverse effects. Interactions associated with the federally and provincially approved KLNG Project concepts that are not affected by the proposed KLNG Expansion Project were not re-evaluated.

Table 5-9 Preliminary Effects Assessment of KLNG Expansion Project on Current Use of Lands and Resources for Traditional Purposes

Candidate VCs	Sub Components	Project Activities (of the KLNG Project, inclusive of KLNG Expansion Project)	Potential Incremental Effects *	Mitigation	Effects Assessment
Current Use of Lands and Resources for Traditional Purposes		Construction: clearing of habitat; excavation; stockpiling; temporary resurfacing; installation of culverts; heavy vehicle traffic; road and infrastructure development; noise and light from construction activities. Operations: vehicle and vessel traffic; road and infrastructure use and associated noise, facility lighting.	Potential changes in the ability to access preferred locations for traditional purposes because of Project activities across all Project phases (e.g., navigational closures, safety exclusion zones, increased vessel traffic congestion). Potential changes in presence or absence, abundance, or spatial distribution of preferred marine, freshwater, terrestrial, or other resources that are currently used for traditional purposes, such as marine fish (including invertebrates), marine plants, marine mammals, terrestrial vegetation and wildlife, migratory birds, and freshwater fish	See First Nations related commitments of EA Certificate E06-01 (Appendix B).	2006 review concluded that the KLNG Project was not likely to result in significant adverse effects. 2008 review concluded there would be no change in significance of potential adverse effects. The proposed changes to the approved project design and operations are not predicted

Candidate VCs	Sub Components	Project Activities (of the KLNG Project, inclusive of KLNG Expansion Project)	Potential Incremental Effects *	Mitigation	Effects Assessment
		Decommissioning: vehicle and vessel traffic; road and infrastructure use and associate noise.	leading to potential loss of fishing, hunting, trapping, or gathering opportunities across all Project phases. Potential changes in the quality of preferred resources that are currently used for traditional purposes, such as marine fish (including invertebrates), marine plants, marine mammals, terrestrial vegetation and wildlife, migratory birds, and freshwater fish, leading to avoidance of traditional foods or otherwise disrupting patterns of use and levels of consumption across all Project phases Potential changes in the quality of experience associated with the current use of lands and resources for traditional purposes across all Project phases may include but may not be limited to: Potential displacement from or avoidance of preferred locations because of sensory disturbance (e.g., increased noise, light), perceived health or safety risks (e.g., increased air emissions, vessel traffic), or changed sense of place. Potential interference with or loss of ability to achieve cultural purposes associated with use of specific locations or resources, such as intergenerational knowledge transfer of practices, customs, or traditions.		to result in significant adverse residual effects.

* The preliminary effects assessment focuses on the expansion of the federally and provincially approved KLNG Project concepts, potential incremental changes and associated adverse effects. Interactions associated with the federally and provincially approved KLNG Project concepts that are not affected by the proposed KLNG Expansion Project were not re-evaluated.

Table 5-10 Preliminary Effects Assessment of KLNG Expansion Project on Land & Resource Use

Candidate VCs	Sub Components	Project Activities (of the KLNG Project, inclusive of KLNG Expansion Project)	Potential Incremental Effects *	Mitigation	Effects Assessment
Land and Resource Use		Construction: clearing of habitat; excavation; stockpiling; temporary resurfacing; installation of culverts; heavy vehicle traffic; road and infrastructure development; noise and light from construction activities. Operations: vehicle and vessel traffic; road and infrastructure use and associated noise.	Potential effects of limiting public access to land and resources near the LNG facility due to safety concerns. Potential effects due to LNG vessel traffic on marine commercial and recreational users' safety, level of mobility, and access to key marine resource areas.	See Land and Resource Use related commitments of EA Certificate E06-01 (Appendix B).	2006 review concluded that the KLNG Project was not likely to result in significant adverse effects. 2008 review concluded there would be no change in significance of potential adverse effects. The proposed changes to the approved project design and operations are not predicted to result in significant adverse residual effects. Access to some land, water and resources may be restricted for safety.

* The preliminary effects assessment focuses on the expansion of the federally and provincially approved KLNG Project concepts, potential incremental changes and associated adverse effects. Interactions associated with the federally and provincially approved KLNG Project concepts that are not affected by the proposed KLNG Expansion Project were not re-evaluated.

Table 5-11 Preliminary Effects Assessment of KLNG Expansion Project on Marine Use & Transportation

Candidate VCs	Sub Components	Project Activities (of the KLNG Project, inclusive of KLNG Expansion Project)	Potential Incremental Effects *	Mitigation	Effects Assessment
Marine Use & Transportation		Construction: dredging adjacent to LBW, vessels. Operations: increased vessel traffic within Douglas Channel and Kitimat Arm. Decommissioning: removal of marine infrastructure and support facilities and reclamation of disturbed areas. Reduction in overall frequency of vessel traffic.	Generation of sediment and turbidity plumes during dredging operations required for LBW. Increased potential for direct and indirect impacts to marine mammals and migratory birds during increased vessel traffic movement. Potential for disruption to commercial, recreational, Aboriginal fishing activities.	KLNG Project TERMPOL submission to Transport Canada was for a single berth facility designed to handle approximately 150 LNG carriers per year ranging in size from of 125,000 m^3 to 217,000 m^3. Transport Canada issued the *TERMPOL Review Process on the Kitimat LNG Project* report in October 2018, outlining their recommendations and findings following review of the technical studies submitted and consultation with the First Nations. See Navigable Waters related commitments of EA Certificate E06-01 (Appendix B). Project to use BC coastal pilots to support safe inbound and outbound transit of LNG carriers, consistent with applicable marine navigation laws and regulations. Operational safety zones will be compliant with all applicable Canadian laws and regulations and will be consistent with industry best practices.	There is a long history of marine transportation activity in the region. The risks associated with the project will be similar to those seen historically in the area. The KLNG Project is proposing to use the same route assessed and approved for LNG Canada. 2006 review concluded that the KLNG Project was not likely to result in significant adverse effects. 2008 review concluded there would be no change in significance of potential adverse effects. The proposed changes to the approved project design and operations will result in increased in marine traffic in Bish Cove and within Douglas Channel, but no significant adverse residual effects are predicted.

* The preliminary effects assessment focuses on the expansion of the federally and provincially approved KLNG Project concepts, potential incremental changes and associated adverse effects. Interactions associated with the federally and provincially approved KLNG Project concepts that are not affected by the proposed KLNG Expansion Project were not re-evaluated.

Table 5-12 Preliminary Effects Assessment of KLNG Expansion Project on Visual Resources

Candidate VCs	Sub Components	Project Activities (of the KLNG Project, inclusive of KLNG Expansion Project)	Potential Incremental Effects *	Mitigation	Effects Assessment
Visual Quality		Construction: clearing and vegetation removal; erection of near shore and onshore facilities; increased vessel traffic Operations: existence of near shore or onshore LNG processing facility visible from Douglas Channel; lighting; flaring (for emergency purposes only) potentially visible from the Town of Kitimat and Kitamaat Village; vessel movements in proximity to Kitimat and Kitamaat Village. Decommissioning: decommissioning activities onshore and increased vessel traffic.	Clearing and vegetation removal during construction could potentially result in visual disturbance and alteration to existing scenic values. Introduction of visible anthropogenic features may be inconsistent with current landscape character and alter existing scenic values. Indirect effects on cultural, recreation and tourism values closely related to activities that are related to visual quality and the enjoyment of visual resources.	Visual Quality Management Plan.	Not previously assessed. Visual simulations for various viewpoints are being prepared to determine the nature and extent of potential adverse effects to visual quality.

* The preliminary effects assessment focuses on the expansion of the federally and provincially approved KLNG Project concepts, potential incremental changes and associated adverse effects. Interactions associated with the federally and provincially approved KLNG Project concepts that are not affected by the proposed KLNG Expansion Project were not re-evaluated.

Table 5-13 Preliminary Effects Assessment of KLNG Expansion Project on Heritage Resources

Candidate VCs	Sub Components	Project Activities (of the KLNG Project, inclusive of KLNG Expansion Project)	Potential Incremental Effects *	Mitigation	Effects Assessment
Heritage Resources	Archaeological Resources Heritage Resources	Construction: clearing; excavation; stockpiling; road and infrastructure development.	Physical disturbance or increased accessibility to archaeological or historical sites could result during clearing, site preparation and construction.	Heritage resources can be avoided or managed. See Heritage and Archaeological Resources related commitments of EA Certificate E06-01 (Appendix B).	2006 review concluded that the KLNG Project was not likely to result in significant adverse effects. 2008 review concluded there would be no change in significance of potential adverse effects. The proposed changes to the approved project design and operations are not predicted to result in significant adverse residual effects.

* The preliminary effects assessment focuses on the expansion of the federally and provincially approved KLNG Project concepts, potential incremental changes and associated adverse effects. Interactions associated with the federally and provincially approved KLNG Project concepts that are not affected by the proposed KLNG Expansion Project were not re-evaluated.

Table 5-14 Preliminary Effects Assessment of KLNG Expansion Project on Human Health

Candidate VCs	Sub Components	Project Activities (of the KLNG Project, inclusive of KLNG Expansion Project)	Potential Incremental Effects *	Mitigation	Effects Assessment
Human Health		Construction: clearing; excavation; heavy vehicle traffic; road and infrastructure development; fuel and chemical handling and storage; noise and light from construction activities; flaring Operations: vehicle and vessel traffic; road and infrastructure use and associated noise; fuel and chemical handling and storage; flaring.	Air quality may be impacted from Project activities which can have a direct (via inhalation) or indirect (deposition onto soil, water, or plants and subsequent exposure via ingestion and dermal contact) effect on human health; physical activities including clearing, grading, compaction and blasting may increase dust levels in air. Potential effects to country foods (plants, berries) with resulting impacts on human health. Increased light and noise emissions may have adverse effects on nearby populated areas. The availability of marine, shoreline, and terrestrial foods and traditional medicines may be restricted by various aspects of the Project during construction and operations. Increase in land-based traffic, increase in marine traffic, and in migration of workers may adversely affect local human health.	See Public Safety and Health/Accidents and Malfunctions related commitments of EA Certificate E06-01 (Appendix B).	2006 review concluded that the KLNG Project was not likely to result in significant adverse effects. 2008 review concluded there would be no change in significance of potential adverse effects. The proposed changes to the certified project design and operations are not predicted to result in significant adverse residual effects.

* The preliminary effects assessment focuses on the expansion of the federally and provincially approved KLNG Project concepts, potential incremental changes and associated adverse effects. Interactions associated with the federally and provincially approved KLNG Project concepts that are not affected by the proposed KLNG Expansion Project were not re-evaluated.

6 Proponent Engagement and Consultation with Indigenous Groups

6.1 Principles of Engagement

As operator of the KLNG Expansion Project, Chevron is committed to collaborating with Indigenous peoples and their communities in Canada, to build long term trusting and mutually beneficial relationships based on the values of inclusion, transparency, respect and accountability.

Chevron's Indigenous Relations Policy is based on the following principles, where Chevron:

- Acknowledges that Aboriginal and Treaty rights of Indigenous people in Canada are recognized, affirmed and protected by the Canadian Constitution.
- Acknowledges the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP) and is committed to working with Indigenous peoples within the Canadian legal and constitutional framework.
- Respects that each Indigenous community has its own unique connection with the land and environment in which they live.
- Recognizes the diversity of Indigenous peoples in Canada and is committed to interacting with each Indigenous community in a way that respects their history, culture and customs.
- Appreciates the importance of learning from and respecting local cultures in areas where we operate.

As part of building long-term trusting and mutually beneficial relationships, the Proponent is committed to engaging 'early and often' with Indigenous communities based on the values of inclusion, transparency, respect and accountability.

6.2 Potentially Affected Indigenous Communities

The Proponent is committed to meaningfully engage with Indigenous communities in areas in which we operate.

As part of the EA application initiated for the proposed KLNG Project in 2005, the EAO issued an order under Section 11 directing KLNG to consult with the Haisla Nation, to identify any specific Indigenous interests that may be potentially affected by the KLNG Project and to identify measures to avoid, mitigate or where appropriate, otherwise address or accommodate them.

In the 2005 EA application the Proponent committed to undertaking a voluntary TERMPOL review process (TRP). Upon the initiation of the TRP in 2011, Transport Canada identified ten First Nations for participation in the TRP based on their locations relative to the two shipping routes originally proposed for the KLNG Project. Following evaluation of both proposed routes, the southern route was discounted reducing the number of potentially impacted First Nations to eight Nations (listed in alphabetical order):

- Gitga'at Nation
- Gitxaala Nation
- Haida (Council of Haida Nation)
- Haisla Nation

- Kitselas First Nation
- Kitsumkalum First Nation
- Lax Kw'alaams Band
- Metis Nation of BC
- Metlakatla First Nation

6.2.1 Haisla Nation

The Haisla Nation occupy the traditional territory of two historic bands–the Kitamaat of the Douglas and Devastation channels and the Kitlope of the upper Princess Royal Channel and Gardner. Kitamaat Village, located at the head of the Douglas Channel, is about 10km south of Kitimat and is the main Haisla Nation village with a population of approximately 1,700 (INAC 2018). The total Haisla Nation population (on and off reserve) is reported as 1,930. The Haisla Nation are part of the Wakashan linguistic group and follow a social system based on eight matrilineal clans; clans provide significant governance direction to the Nation.

The proposed Kitimat LNG facility is located on Haisla Nation reserve (Bees IR No. 6) at Bish Cove, 14 km south of Kitimat, BC on land eased through a commercial lease and benefit agreement with the Haisla Nation.

The Haisla Nation and the Proponent also have an Impact Benefits Agreement related to the Kitimat LNG Project. The Haisla Nation is also a member of the PTP First Nations Limited Partnership (FNLP). The FNLP is comprised of 16 First Nations located along the proposed 480 km pipeline designed to transport natural gas from Summit Lake, BC to the proposed KLNG export terminal. The benefits agreements with the Haisla Nation and FNLP are commercial benefits agreement that includes training, employment, procurement, environmental stewardship, and financial provisions.

6.3 Key Issues Identified by Indigenous Groups to Date

6.3.1 Haisla Nation

Issues and concerns raised up until 2009 have been addressed through the original EAC and 2009 amendment. Since that time, Haisla Nation has raised the following issues and concerns regarding the proposed Kitimat LNG plant site:

- **Business opportunities and procurement** - concerns related to the implementation of the IBA (e.g. Chevron's primary contractors were not providing adequate consideration to Haisla Nation joint venture companies as outlined in the agreement)
- **Employment and training** - delivery (i.e., timing, certainty, nature and extent) of employment and training related benefits to Haisla Nation members
- **Fish and fish habitat** - potential impacts on fish and fish habitat from construction of the LBW including direct loss of eel grass habitat in Bish Cove and resulting impacts on Bish Cove and other local fisheries
- **Soil management and disposal at sea** – concern that one of the disposal sites proposed could take up the entire width of Douglas Channel, concerns with effects from underwater slurry discharge and

regeneration time for the site once disposal is completed, importance of engaging Haisla Nation community directly regarding the proposed alternative to soil disposal

- **Traditional use** - potential socio-economic impacts resulting from any adverse effects on salmon and other fish given the significance of fisheries to Haisla Nation, as well as lost beach access and the importance of continued access to the plant site for traditional purposes

Note that since Haisla Nation raised concerns about the procurement process in 2015, Chevron and Haisla Nation have met to review and discuss expectations and have jointly developed an improved Procurement Engagement Process for notifying Haisla Nation of potential contracting opportunities.

6.3.2 First Nations located along the Marine Transportation Corridor

During the TERMPOL Review Process, the following issues and concerns were raised by First Nations located along the proposed marine transportation corridor (listed in alphabetical order):

- **Environmental concerns** – general environmental impacts to marine mammals, fish and fish habitat and the overall ecosystem including air and water quality impacts
- **Fishing and harvesting** – potential loss of income or livelihood, increased risk of losing access to harvestable area(s) and anchorage points, negative impact on harvesters' qualitative experience including an increased risk of collision with LNG Carriers and support vessels, increased risk to personal safety of harvesters
- **Garbage/waste and pollution** – potential for damage to areas of traditional use from garbage and waste
- **Human health concerns** – potential for adverse impacts including increased risk to personal health or safety when harvesting or consuming harvested materials, impacts on mental health and person wellbeing (e.g. due to inability to practice traditional use activities), negative impact on distinctiveness of culture (e.g. loss of culture and history)
- **Invasive species** – potential for damage to marine resources from the introduction of invasive species
- **Marine resources** – concerns with loss of quality and quantity of harvestable resources during all phases of the KLNG Project (pre-construction, construction and operations)
- **Marine safety and vessel traffic** – potential impacts to traditional marine resources from increased risk of spills, accidents and malfunctions as well as the need for emergency response planning and equipment
- **Regional and cumulative effects** – potential for broader impacts from one or more LNG projects including effects from increased vessel traffic in the region
- **Tides and weather** – potential effects of increased shipping on access to harvesting locations at the required tide and weather conditions, and access to specific anchorages or travel routes needed to safely navigate in bad weather
- **Traditional use** – potential for adverse impacts including loss of physical use and access to traditional harvesting, spiritual and historical sites, as well as the potential for interference or damage to harvesting gear or equipment, and loss of anchorage points
- **Vessel wake** – potential for adverse impacts on harvesting activities which primarily occur at low tide and may be dangerous to people and small boats on or near the shore

Avoidance or mitigation measures have been put in place, or are in the process of being jointly developed, to address specific issues and concerns. In some cases, it is challenging to put detailed operational-level plans in place given the current stage of the project. Chevron has therefore committed to develop and finalize operational plans and protocols prior to a Final Investment Decision (FID), in consultation with First Nations.

6.4 Ongoing Engagement and Consultation Activities

The Proponent is committed to ongoing engagement with First Nations potentially impacted by the Kitimat LNG Project.

Engagement is ongoing with the Haisla Nation to further review and discuss the Proponent's plans for the KLNG Facility including working together to identify and implement mitigation measures and fish habitat offsetting plans to address adverse impacts while continuing to engage in IBA negotiations There will be further dialogue with the First Nations located along the marine transportation corridor to share information and to develop and fulfil the commitment to finalize operational plans and protocols prior to FID.

The Proponent has sent out a letter dated July 5, 2019, updating the potentially impacted First Nations on changes in design and capacity of the Project and the upcoming regulatory processes. Several First Nations responded that they are looking forward to working together through these regulatory processes. The Proponent will offer to meet, over the next several months, with each of the potentially affected First Nations to provide a project update, answer any questions and to work collaboratively to identify any specific interests or concerns regarding the KLNG Expansion Project.

Future engagement with First Nations will be guided by the outcome of the CEAA screening and the anticipated Provincial amendment process. Once the regulatory process has been determined the Proponent understands that the regulator will identify and delegate procedural aspect of consultation to the Proponent in accordance with the determined process. The Proponent will develop and implement an Indigenous Consultation Plan in accordance with the regulator's decision and direction.

7 Consultation with the Public and Other Parties

The Proponent and its predecessors have engaged with all levels of government to share information and seek input throughout the course of the Project. Engagement has included extensive discussions and dialogue with:

- Broadly across federal departments and agencies including (but not limited to) ECCC, DFO, INAC, Natural Resources Canada and Transport Canada;
- Broadly across BC provincial departments and agencies including (but not limited to) the Ministry of Energy, Mines and Petroleum Resources, the Oil and Gas Commission, the ECCS, the BCEAO, the Ministry of Forestry, Lands and Natural Resource Operations and Rural Development; and
- Municipalities and regional districts including the District of Kitimat.

As per requirements under the KLNG EA Certificate, the Proponent has provided opportunities for public engagement primarily through open house events in Kitimat, project newsletters, notices in local community newspapers, and the project website. In addition, the Proponent maintains and staffs a KLNG community office in downtown Kitimat and provides a toll-free feedback line.

Discussion and dialogue are also ongoing with several local community groups including the Kitimat Valley Institute, Kitimat Valley Naturalists, Douglas Channel Watch, Kitimat Chamber of Commerce, and Kitimat Economic Development Association.

The Proponent has been and will continue to work with local industry and industry organizations to provide information and facilitate briefings, as appropriate, to ensure local suppliers and contractors are fully aware of potential opportunities.

7.1 Ongoing Engagement and Consultation Activities

The Proponent is committed to sharing information and updates on the KLNG Project with the external parties. Input will be incorporated into project planning where issues and concerns will be addressed through avoidance and/or mitigation measures. It is anticipated that the Kitimat Community office, open house events in Kitimat, the project website and direct stakeholder and rights holder engagement will continue to serve as important communication methods, supplemented from time to time by project newsletters and notices in local community newspapers, as appropriate.

Engagement with various levels of government and regulatory authorities will be ongoing as the project moves forward. The Proponent will develop an engagement plan for the various stakeholders that is aligned to the various future regulatory processes.

8 References

Banner, A, MacKenzie, WH, Haeussler, S, Thomson, S, Pojar, J and Trowbridge, RL, 1993, A Field Guide to Site Identification and Interpretation for the Prince Rupert Forest Region. Land Management Handbook No. 26. British Columbia Ministry of Forests. 281 p.

BC Government, 2002, Kalum Land and Resource Management Plan. A Component of British Columbia's Land Use Strategy. May 2002. Available at: https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/natural-resource-use/land-water-use/crown-land/land-use-plans-and-objectives/skeena-region/kalum-lrmp/kalum_lrmp.pdf

BC Government, 2018, CleanBC, our nature, our power, our future. Province of British Columbia. December 2018. Available at: https://blog.gov.bc.ca/app/uploads/sites/436/2019/02/CleanBC_Full_Report_Updated_Mar2019.pdf

British Columbia Environmental Assessment Act (BCEAA), 2002 (S.B.C. 2002, c. 43)

Canadian Environmental Assessment Act, 1992 (former CEAA) (S.C. 1992, c. 37)

Canadian Environmental Protection Act, 1999 (S.C. 1999, c. 33)

Canadian Environmental Assessment Act (CEAA), 2012 (S.C. 2012, c. 19, s. 52)

Canada Marine Act (S.C. 1998, c. 10)

Disposal at Sea Regulations (SOR/2001-275)

Explosives Act (R.S.C., 1985, c. E-17)

Fisheries Act (R.S.C., 1985, c. F-14)

INAC (Indigenous and Norther Affairs Canada), 2018, INAC First Nation Profiles. Available at: http://fnp-ppn.aandc-aadnc.gc.ca/fnp/Main/Index.aspx?lasng=eng

Indian Act (R.S.C., 1985, c. I-5)

Marine Transportation Security Act (S.C. 1994, c. 40)

Migratory Birds Convention Act, 1994 (S.C. 1994, c. 22)

National Energy Board Act (R.S.C., 1985, c. N-7)

Navigation Protection Act (R.S.C., 1985, c. N-22)

Official Languages Act (R.S.C., 1985, c. 31 (4th Supp.))

Regulations Designating Physical Activities (SOR/2012-147)

Species at Risk Act (SARA) (S.C. 2002, c. 29)